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SPECIFIC GRAVITY OF FLUID EXTRACTS.

BY G. H. CHAS. KLIE.

The "Pharmacopœia" gives formulæ for quite a number of fluid extracts, with mode of preparation circumstantially described, and apparently all proper precaution taken to insure efficient preparations. An experienced operator, if he uses good drugs, will no doubt generally make good fluid extracts. What the "Pharmacopœia" fails to give is a standard to measure the strength of the fluid extracts by. If such an one had been adopted, very likely, more uniformity in strength would result in this class of preparations.

Of the different methods to find the strength of fluid extracts, specific gravity, presumably, is as good as any. Its adoption as the standard would force the preparer, if he wanted to attain it, to use the prescribed menstrua. Another point in its favor is: it is easily ascertained and in a comparatively short time.

Precipitation is very accurate in estimating the strength of fluid extracts, but it consumes more time and does not indicate the menstrua.

To understand the specific gravity of the different extracts properly, that of the menstrua, with which they are severally prepared, must be taken into consideration, or rather, in what approximate proportion the menstruum exists in the extracts when done. The "Pharmacopœia" directs the use of six different primary menstrua, viz.: Alcohol alone, and alcohol, glycerin and water in 5 proportions, and several secondary menstrua of alcohol and water. Six primary menstrua are given in the list below, one of them being diluted alcohol, which alone is not directed in any of the fluid extracts. The specific gravity in the list of extracts marked "purchased" seems to indicate that one of them was made with alcohol and the others with dilute alcohol. One of

the menstrua of alcohol, glycerin and water is not represented in the list.

The strength of a fluid extract is indicated by the difference between its own specific gravity and that of the menstruum. What is required, therefore, is to know the specific gravity of the approximate menstrua, not as they are used for percolation, but as they are likely to exist in the extract when done.

I have ascertained the specific gravity of the fluid extracts which I have on hand. Below I give the list with the specific gravity of each annexed. 28 are officinal and 18 non-officinal, 39 are of own make and 7 purchased. Before each series of fluid extracts the approximate menstruum and its specific gravity has been placed. As a matter of course due regard has been paid, during process of weighing, to the temperature of the extracts and the state of the atmosphere, the thermometer showing 60° Fahrenheit and barometer 30 in.

Alcohol, ...	·825
Extract. buchu fluid. . .	·895
" cimicifugæ fluid. .	·890
" damianæ fluid. purch'd,	·935
" cubebæ fluid. . .	·871
" gelsemini fluid. .	·904
" serpentariæ fluid. .	·910
" valerianæ fluid. .	·975
Alcohol dilutum, . . .	·942
Extract. lactucæ fluid. purch'd,	·992
" pareiræ brav. fluid. "	·975
" sennæ comp. fluid. "	1·025
" apocyn. cannab. fluid.	·982
" hyoscyami fluid. "	1·025
" grindel. robust. fluid."	1·028
Alcohol, pts. 6 *Glycerina*, " 1 *Aqua*, " 1 } . .	·957
Extract. colombæ fluid. . .	1·012
" hydrast. can. fluid. .	·971
" rhei fluid· . .	1·086
Alcohol, pts. 7 *Glycerina*, " 4 *Aqua*, " 5 } . .	1·004
Extract. belladonnæ fol. fluid.	1·098
" caffeæ "	1·124
" collinsoniæ "	1·045
" cort. aurant. "	1·101
" cinchonæ rubr. "	1·092
" alni rubr. "	1·044
" digitalis "	1·075
" ergotæ "	1·071
" eucalypt. glob. "	1·073
" gossypii "	1·023
" gentianæ "	1·085
" kalmiæ latif. "	1·095
" kousso "	1·091
" lappæ "	1·132
" liquiritiæ "	1·101
" pruni virg. "	1·095
" pteleæ "	1·043
" stillingiæ "	1·055
" sambuci "	1·102
" sumbul "	1·031
" senegæ "	1·091
" taraxaci "	1·121
" uvæ ursi "	1·131
" scillæ comp. "	1·163

Glycerina, pts. 4 *Aqua*, parts 2 *Alcohol*, pts. 3	. .	1·056
Extract. sarsapar. cp. fluid.		1·093
Alcohol, pts. 5 *Glycerina*, " 8 *Aqua*, " 3	. .	1·087

Extract. sarsaparillæ fluid.		1·121
" sennæ "		1.141
" sennæ et spigel. "		1·127
" spigeliæ "		1·118
Glycerina, pt. 1 *Aqua*, " 1	. .	1·147
Extract. ipecacuanhæ fluid.		1·207

Lowell, N. St. Louis, Nov. 5th, 1876.

PREPARATIONS OF MALT.

BY RICH. V. MATTISON, PH.G.

(*Read at the Pharmaceutical Meeting November* 21.)

For several years past there seems to have been an observed tendency among physicians toward the use of a class of preparations more or less representing the saccharine and albuminoid constituents of malted barley, and a number of medicinal preparations have been gradually introduced, some of which have found considerable favor among the profession as a slightly-tonic and valuable nutrient food, employed in dyspeptic and other stomachic disorders, caused by the non-assimilation of starch food.

Probably the most widely known in this country is the "Hoff's Malt Extract," which most of the members present may remember particularly, on account of the great difficulty experienced in being able to obtain it during the late Franco-German war, and the notoriety which one of our eminently-respectable houses at that time attained, through being able to supply, as genuine, a preparation put up in the ordinary London Stout bottles, with *fac simile* German labels. The genuine preparation does not seem to the writer to be properly called an extract of malt, since it certainly partakes more of the nature of a malt liquor, the principal difference being that it is of sweeter taste and less spirituous—more sugar and less alcohol than the ordinary malted liquors of commerce. The fact, however, of its containing a notable proportion of alcohol renders it, in the opinion of the writer, an objectionable article; not objectionable as a malt liquor, understand, but as an *extract of malt*, since a large portion of the sugar has been converted by fermentation into alcohol.

The nutrient properties of a good malt extract consist in the amount of malt sugar, diastase, etc., that is obtainable therefrom by the assimi-

lative organs of the human system, and to insure the proper amount of these principles depends upon the proper observance of four rules, viz.:

1st. The barley must be malted properly and carefully, to insure the formation of as large a quantity of diastase as possible, that by its action in mashing all the starch may be converted into sugar. The chemical change may be thus represented, the starch taking up the elements of water:

Starch. Glucose. Dextrin.

$$3C_6H_{10}O_5+H_2O = C_6H_{12}O_6 + 2C_6H_{10}O_6$$

2d. The ground malt must be *mashed* carefully, with due regard to the temperature, so as to insure the largest amount of sugar being extracted with the smallest amount of water.

3d. The evaporation of the extract with a low degree of heat, to avoid charring any of the delicate constituents of the extract.

4th. The most scrupulous cleanliness must be observed at all times in and about all mash-tubs, kettles, capsules or other vessels used in its preparation.

A word as to the object of the preparation may not be out of place. It is well known that in the human economy the salivary glands and the pancreas secrete analogous principles, each having for its object the conversion of amylaceous principles into saccharine, that existing in the salivary secretion being known as ptyalin and that of the pancreatic juice as pancreatin. In the malted barley there is found a substance analogous to these, and having just as strong and subtle power of changing starch into sugar as the pepsin in the gastric secretion has the power of converting albuminous substances into peptone. This substance in malted barley is called diastase, and is formed during the process of germination or malting. A small portion of this substance has the power of converting an almost indefinite proportion of starch into sugar.

These facts being known, it is obvious that when the animal system is incapable, through deficiency of the natural secretions, of converting starch food into sugar, we must add some artificial saliva, as it were, to perform the work and make good the deficiency, and hence it is that the heavy feeling in the stomach observed after eating heartily of potatoes, corn-starch and other graminaceous or amylaceous food, is promptly removed by taking a small quantity of a good extract of malt.

Barley grown in high latitudes like Michigan, Canada and the like,

is generally the best, because of its containing more starch, which, in the process of mashing, is converted into sugar, and of course, there being more sugar, the yield of extract is larger, thus making the operation more successful, pecuniarily, to the manufacturer.

The process of malting we need not describe, being familiar to us all, and for the purposes of the malt-making pharmacist may be practically ignored, it being better to purchase the malted barley of a professional maltster.

The barley, then, being properly malted, is ground coarsely, and a tub, preferable of cedar, with a false bottom, perforated, and of a capacity of say 20 gallons (an old-fashioned upright churn answers very well), is filled with about 14 gallons of water, at a temperature of from 168° to 172° F. Into this tub about half a bushel of malt is added, little by little, until the whole is well stirred in. The tub is then well covered and set away in a warm room, and allowed to remain perfectly at rest for a period of three or four hours, taking care that the temperature does not fall below 150°F.

This is the process of *mashing*. At the expiration of the allotted time, the stop-cock below the perforated diaphragm is opened, and water of a temperature a little above the extract, which is now being drawn off below, and which we shall now call the *wort*, is sprinkled by means of a sieve or plant-sprinkler, upon the top of the malt until the wort being drawn off below is almost tasteless or of so low a specific gravity that it will not pay the cost of evaporation. In large operations this sprinkling is done by means of a patented revolving instrument called a "sparge," and which much resembles a lawn-sprinkler, that revolves by the pressure of the water being ejected from each side in opposite directions, the water being supplied from a large tank in which it is heated by steam, and the exact temperature being easily controlled by valves commanding abundant supplies of both cold water and steam. This wort that we have drawn off from our mash-tub or percolator, we now place in the capsule or copper kettle, and evaporate by means of a water-bath to the required consistence; the first run should have a high specific gravity, and contain about a pound of malt sugar to the gallon of wort. We present samples of this evaporated wort, which is now our malt extract.

A word now regarding cleanliness. The mash-tub and all other wooden or metal utensils should be washed out at least once a week

with dilute solution of caustic potash or soda, and any barrels, tubs, etc., should be kept filled with lime water when not in use, as the tendency of the wort which may be left in them is very great toward fermentation, and a few grains of malt accidentally left in the tub, and which have undergone putrefactive change, may completely spoil the subsequent batch of malt at the next mashing.

Extract of malt with iron is easily prepared by the addition of a syrupy solution of ferric pyrophosphate, in the proportion of four grains to the tablespoonful.

Extract of malt with pepsin has been proposed as a valuable preparation in dyspeptic troubles, since it would certainly have valuable digestive properties, acting upon both amylaceous and albuminous substances.

Extract of malt with cod liver oil is proposed as the acme of all emulsions of cod liver oil. When we reflect on the fact of cod liver oil being simply food and not medicine, and then combine this with a preparation having of itself the property of transforming non-assimilable food into that which may be easily assimilated, beside being a valuable nutrient, we have as an emulsion (and it makes a perfect emulsion without the use of any gum, sugar or other vehicle) a preparation of double the nutrient value of the ordinary emulsions of cod liver oil. A preparation, also, that is very pleasant to the palate as well as the stomach, a fact that, in these days of elegant pharmacy need not be overlooked.

Samples of this preparation, consisting of 50 per cent. each of cod liver oil and extract of malt, are here presented. It is easily prepared, is both pleasant and permanent, and may be mixed with water without separating the oil.

CONTRIBUTIONS FROM THE SCHOOL OF PHARMACY OF THE UNIVERSITY OF MICHIGAN.

Communicated by PROF. ALBERT B. PRESCOTT.

IX. *Precipitations by the Phosphoric Acids.* By JAMES W. MORGAN, Ph.C.

This investigation was to ascertain what normal metallic salts, in solution, will form precipitates by addition of solutions, respectively, of free orthophosphoric, pyrophosphoric and metaphosphoric acids. Farther, in cases of such formation of precipitates, what quantities of certain acids are needed to dissolve them; and, in cases of non-forma-

tion of precipitates, what proportion of the phosphoric acids must be neutralized by alkalies in order to cause the precipitates?

All the metallic salts and all the acids were obtained and used in solutions of known strength.

The orthophosphoric acid was prepared by the first process of the U. S. "Pharmacopœia" for the diluted acid, and was used of the strength of that preparation, near 10 per cent. of acid.[1]

For the pyrophosphoric acid, ordinary sodium phosphate was fused to pyrophosphate; the solution of the latter precipitated by lead acetate solution, and the washed precipitate transposed with hydrogen sulphide. The filtrate was freed from gas by evaporation in vacuo at ordinary temperature. The solution was found free from sodium salt and from extraneous acids. One cc. contained 0·0608 gram of the acid.

The metaphosphoric acid was prepared by evaporating the solution of orthophosphoric acid to dryness and gently igniting the residue. Of this, 10·550 grams were dissolved in 300 cc. of water, or 0·035 grams of acid to one cc. of water. Heat was avoided in dissolving, and the solution was used fresh.

Solutions of the following *metallic salts* were prepared, each in three degrees of strength, 5 per cent., 1 per cent. and ½ per cent.

Barium chloride, absolute;	Ferrous chloride, absolute;
Calcium chloride, absolute;	Ferrous sulphate, cryst.;
Magnesium sulphate, cryst.;	Lead nitrate, cryst.;
Aluminium sulphate, cryst.;	Lead acetate, cryst.;
Ferric chloride, absolute;	Silver nitrate, cryst.
Tincture of chloride of iron;	

The *nitric acid* used for dissolving precipitates was 35 per cent. of hydrogen nitrate; the *hydrochloric acid*, 24 per cent.; and the *soda solution* used to neutralize phosphoric acid and produce precipitates was 7 per cent. of sodium oxide.

[1] Another solution of same strength was prepared from common sodium phosphate by precipitation with lead acetate, and decomposition of the lead phosphate with hydrogen sulphide, the filtrate being freed from the gas. This solution was found to have a trace of sulphuric acid from contamination of the sodium phosphate with sulphate; the testing of this salt having been neglected until the preparation was completed. The process worked well.

With ten per cent. solution of orthophosphoric acid:

Four cc. of the salt solutions treated with 1 cc. of the orthophosphoric acid.	Resulting precipitates dissolved by adding:	In 1 cc. salt sol. with 3 cc. phos. acid sol.		
		Soda sol. added *to cause a precip.*	Amt. phos. acid neutralized (grams).[1]	Proportion of phos. acid neutralized.
Barium chlor., 5 p. c.	No pre.	1·0 cc.	0·110	36 p. c.
" " 1 p. c.	"	1·5 cc.	0·116	59 "
Calcium chlor., 5 p. c.	"	1·2 cc.	0 133	43 "
" " 1 p. c.	"	1·6 cc.	0·177	59 "
Magnesium sul., 5 p. c.	"	3·0 cc.	0·300	100 "
Aluminium sul., "	"	1·6 cc.	0·177	59 "
Ferric chlor., 10 p. c.	"	1·0 cc.	0·110	36 "
" " 5 p. c.	"	3·0 cc.	0·300	100 "
" " tincture	"			
Ferrous chlor., 5 p. c.	"	3·0 cc.	0·300	100 "
Ferrous sul., "	"	1·3 cc.	0·143	47 "
Lead nitrate, 5 p. c.	Pre.	8 cc. nitr. ac.		
" " 1 p. c.	"	2 cc. "		
" " ½ p. c.	"	1 cc. "		
Lead acetate, 5. p. c.	"	6 cc. "		
" " 1 p. c.	"	2 cc. "		
" " ½ p. c.	"	1 cc. "		
Silver nitr., 5 p. c.	"	7 cc. ortho. ac.		
" " 1 p. c.	No pre.	. .		
" " ½ p. c.	"	. .		

The lead precipitates were insoluble in excess of the orthophosphoric acid solution.

With six per cent. pyrophosphoric acid solution no precipitates were formed with any of the salt solutions named above, except those of ferric chloride, lead nitrate and acetate, and silver nitrate, which were formed as follows, on adding 1 cc. of the pyrophosphoric acid to 4 cc. of the salt solutions:

Ferric chloride, tincture; precipitate thick.
" " 10 p. c.; pre. soluble in 20 cc. of pyro. ac. or 5 cc. HCl.
" " 5 " " " 5 cc. " or 3 cc. "
" " 1 " " " 2 cc. " or 1·5 cc. "
Lead nitrate, 5 " " not soluble in pyro. acid, sol. in 1 cc. nitric.
" " 1 " " " " " 0·3 cc. "
" " ½ " " " " " 0·15 cc. "
Lead acetate, 5 " " " " " 3 cc.
" " 1 " " " " " 0·8 cc. "
" " ½ " " " " " 0·4 cc. "
Silver nitrate, 5 " " " " " 0·5 cc. "
" " 1 " no pre.

[1] The neutralization was predicated on formation of two-thirds metallic salt.

With three and a half per cent. solution of metaphosphoric acid:

Four cc. of the salt solutions treated with 1 cc. of the metaphosphoric acid:		Resulting precipitates dissolved by adding:	In 1 cc. salt sol. with 3 cc. metaphos. ac.		
			Soda sol. added *to cause pre.*	Amt. phos. acid neutralized.	Proportion of phos. acid neutralized.
Barium chlor., 5 p. c.	No pre.	. . .	0·4 cc.	0·076 grm	74 p. c.
Calcium chlor., 5 p. c.	"	. . .	0·4 cc.	0·076 "	74 "
" " 1 p. c.	"	. . .			
" " ½ p. c.	"	. . .			
Magnes. sul., 5 p. c.	"	. . .	1·7 cc.	0·307 "	292 "
Alumin. sul., 5 p. c.	"	. . .	2·0 cc.	0·361 "	343 "
Ferric chlor., 10 p. c.	Precip.	12 cc. meta. ac. or 10 cc. HCl			
" " 5 p. c.	"	5 cc. meta. ac.			
" " 1 p. c.	"	2 cc. meta. ac. 1 cc. HCl			
" " tincture	"	large excess HCl			
Ferrous chlor., 5 p. c.	No pre.	. . .	1·0 cc.	0·180 "	171 "
Ferrous sul., 5 p. c.	"	. . .	0·5 cc.	0·090 "	85 "
" " 1 p. c.	"	. . .	1·0 cc.	0·180 "	171 "
Lead nitrate, 5 p. c.	Precip.	10 cc. meta. ac. 1·4 cc. nitric ac.			
" " 1 p. c.	"	2 cc. meta. ac.			
" " ½ p. c.	"	0·7 cc. meta. ac.			
Lead acetate, 5 p. c.	"	5 cc. meta. ac. 0·7 cc. nitr. ac.			
" " 1 p. c.	"	1 cc. meta. ac.			
" " ½ p. c.	"	0·4 cc. meta. ac.			
Silver nitrate, 5 p. c.	"	8 cc. meta ac. 5 cc. nitric ac.			
" " 1 p. c.	No pre.	. . .			

With the ferric chloride tincture, the thick white precipitate was only made gelatinous by addition of excess of the metaphosphoric acid.

In production of *metallic precipitates*, the sharpest distinction between the phosphoric acids appears to be, with ferric salts, between orthophosphoric acid and the other two. Both ferric pyrophosphate and ferric metaphosphate are soluble in excess of their respective phosphoric acids, if in water solution, but, in case of metaphosphate, not soluble in the alcoholic solution of the pharmacopœial tincture. Lead and silver salts are precipitated by each of the three forms of phosphoric acid; the lead metaphosphate being soluble in excess of metaphosphoric acid (a distinction from both the other phosphoric acids). The

distinction between ferrous and ferric salts, by metaphosphoric acid, is well defined.

The large excess of alkali required to give a precipitate in the mixture of metaphosphoric acid and certain salts, as aluminium and magnesium salts, may be due to the formation of soluble double metaphosphates, representing polymeric modifications of the monobasic acid.

The proportion of neutralized phosphoric acids (sodium phosphates) which can be present in solutions, without causing precipitates in salt solutions, is a question of interest, because of the presence of alkaline phosphate in the glacial acid and solutions made therefrom.

It was to determine this question, and also to settle some doubts as to how far the metallic precipitates, stated in the books for the *free* phosphoric acids, have been due to unknown presence of alkaline phosphates, that these experiments were made.

University of Michigan, November 14, 1876.

GLEANINGS FROM THE FOREIGN JOURNALS.

BY THE EDITOR.

Composition of Xanthium Spinosum.—Yvon and Nocard have obtained from 100 parts of the air-dry plant 11·828 water, 76·518 of organic and 11·654 parts of inorganic matter. Among the organic constituents was found 10·632 starch, 0·808 glucose, 2·040 chlorophyll and resin soluble in ether, the remaining 63·038 consisting of cellulose, acids and probably an alkaloid. The mineral constituents were those usually found in plants, lime (2·454 p.) and magnesia (2·436 p.) preponderating. Not a trace of alkaloid could be detected in the decoction with acidulated water, which had been treated with milk of lime, and the precipitate digested with alcohol and chloroform; but by using alcohol, and following the process of Stas, liquids were obtained, which yielded precipitates with several of the general reagents for alkaloids. But similar reactions may be obtained on treating sandarac, olibanum and other resins in a similar manner.—*Rép. de Phar.*, 1876, p. 546.

Olive-tree bark as a febrifuge is recommended by L. Thibon, of Tournai, who has prepared from it a principle named *oliverin*, which he prepares as follows: The aqueous decoction of the bark is evaporated to a syrupy consistence; this is precipitated by strong alcohol, and the filtrate again by the careful addition of oxalic acid. The

filtrate from the last precipitate deposits the oliverin on slow evaporation. After washing with cold water it forms yellow granules, which are slightly odorous and very bitter. Dr. Fabry reports remarkable cures with this substance, which is given in the dose of 0·10 to 0·30 grams four or five times a day; the author requests physicians to try it in all cases where quinia is indicated.—*Ibid.*, 558.

Veratria.—Ernst Schmidt and R. Köppen have again examined this alkaloid as prepared by themselves from sabadilla, and from commercial alkaloid, and obtained results which in the main agree with those originally obtained by Merck ("Amer. Jour. Phar.," 1856, p. 134), except that they find its formula to be $C_{32}H_{50}NO_9$ (O=16). They also found Weigelin's observation (1871) correct regarding the existence of a veratria, which is soluble in water and may be obtained by precipitating a veratria salt by ammonia in the cold and washing it with cold water in which it gradually dissolves, but is reprecipitated by heat. On evaporating the solution in vacuo, a yellowish amorphous mass is obtained, which is again readily soluble in water and has the composition of the crystalline modification. The resinous mass, which is dissolved from the crude veratria by cold dilute alcohol, is another modification of the same alkaloid, differing from the first by not being crystalline, and from the second by the sparing solubility in water; the first and the last are gradually converted into the second modification by precipitating them in the cold and prolonged washing with cold water.

The authors have also examined samples of commercial veratria from six manufacturers, and found them pure and free from sabadillia and sabatrina, which are rather freely soluble in water; they dissolved completely in ether, in which sabadillia is insoluble.—*Ber. d. deut. Chem. Ges.*, 1876, 1115–1221.

The bark of Erythropheum guineense, the mancone of the Portuguese, contains an alkaloid, which was obtained in a crystalline state by E. Hardy and N. Gallois by exhausting the bark with alcohol acidulated with muriatic acid, evaporating, dissolving in water and decomposing by ammonia in the presence of acetic ether. The *erythropheïn* is crystalline, sparingly soluble in ether and chloroform, but readily in acetic ether. Physiologically, it acts as a muscular poison, acting primarily upon the heart, arresting its action in systole. The bark of E. cuminga contains an alkaloid having a similar physiological action.—*Chem. Centralbl.*, No. 40, from *Bull. Soc. Chim.*

Hops as a Ferment.—L. Pasteur has also made experiments with the view of throwing light upon the assertion of Sacc that hops contain a peculiar ferment (see this journal, pp. 320 and 467), and arrives at the conclusion that the presence of hops has no influence upon the fermentation of dough, and that its principal office appears to be, to impart to the bread a peculiar bitterish taste which may be relished by some persons.—*Ibid.*, No. 41, from *Comp. rend.*, vol. 83, p. 107.

Adonis vernalis, Lin.—F. Linderos obtained from the dried leaves of this plant, which are medicinally employed in some parts of Europe on account of their drastic properties, nearly ten per cent. of aconitic acid, which appears to be combined with calcium and patassium.—*Ann. Chem.*, vol. 182, p. 365.

Betulin was obtained by U. Hausmann from the light corky layer of the European birch bark, after exhausting it with hot water, by precipitating the alcoholic decoction with an alcoholic solution of lead acetate, heating the mixture to boiling and precipitating the hot filtrate with ammonium carbonate. On cooling, it formed a crystalline magma which was pressed and purified by repeated washings with little ether and recrystallizations from hot alcohol. It forms colorless long prisms, compressible to a shining felt-like mass, is easily rubbed to powder between the fingers, inodorous, tasteless, fusible at 250° C. (corrected 258° C.), and partly sublimes in thin needles. It is insoluble in water, but dissolves in alcohol, ether, benzol and choloroform. Its composition is $C_{36}H_{60}O_3$, and with acetic anhydrid forms betulin-diacetate, a crystallizable ether. By dry distillation, oily products are obtained, which possess in a high degree the characteristic odor of Russian leather.—*Ibid.*, p. 368–380.

Glycyrrhizin was observed by Gorup-Besanez (1861) to be a glucoside, being split, when boiled with water, into sugar, and into the brown-yellow resinous glycyrretin. P. Weselsky and R. Benedikt have treated the latter with fusing potassium hydrate, and obtained from the fused mass paraoxy-benzoic acid ($C_7H_6O_3.H_2O$) as the principal product of decomposition.—*Ber. d. deut. Chem. Ges.*, 1876, p. 1158.

Vanillin is the sole odorous principle of vanilla, according to the investigations of F. Tiemann and Wm. Haarmann. The aqueous liquid which is obtained in the estimation of vanillin by their process (see page 132), yields to pure ether an organic acid, which was recognized

as vanillic acid, while the etherial tincture which had been agitated with the solution of bisulphite of sodium, contains a fat which is occasionally rancid and a resin possessing, particularly when heated, a characteristic odor of castoreum, which is readily covered by the odor of vanillin. This was found to be the case with Mexican, Bourbon and Java vanilla; but the so-called vanillon, which has an odor resembling heliotrope, yielded besides vanillin and vanillic acid, an oil possessing the odor of oil of bitter almonds, and which is probably benzaldehyd.—*Ibid.*, p. 1285–1292.

Occurrence of glucose in alcohol.—G. Salomon has obtained from commercial alcohols residues which reduced oxide of copper. In one case he obtained from one litre 0·13 grams glucose, which impurity was most likely dissolved from the barrel in which previously other liquors may have been kept. This impurity is of particular importance in analytical investigations.—*Chem. Centralbl.*, No. 33.

The acids of the juice of unripe grapes.—Erlenmeyer and Hoster have rendered it very probable that the juice of unripe grapes contains glycolic and oxalic acids; Schwarz has found malic acid in it, and H. Schwarz and R. Brandenburg now announce the presence of succinic acid. If glyoxylic acid should be also discovered in the juice, the production of the acids can be explained by the reducing influence of light as follows:

$2(CH_2O_3)+H_2$ = Oxalic acid $C_2H_2O_4+2H_2O$
$C_2H_2O_4+H_2$ = Glyoxylic acid $C_2H_2O_3+H_2O$
$C_2H_2O_3+H_2$ = Glycolic acid $C_2H_4O_3$
$2(C_2H_2O_3)+H_2$ = Tartaric acid $C_4H_6O_6$
$C_4H_6O_6+H_2$ = Malic acid $C_4H_6O_5+H_2O$
$C_4H_6O_5+H_2$ = Succinic acid $C_4H_6O_4+H_2O$

—*Ber. d. deut. Chem. Ges.*, 1876, 982.

Reagent for Glucose.—A. Soldaini recommends to dissolve 15 grams of precipitated carbonate of copper in a warm solution of 416 grams potassium dicarbonate in 1400 c.c. of water. The reagent is reduced by grape- and milk-sugar, but not by cane-sugar, dextrin or starch-paste, unless they contain glucose. Normal urine, tartaric and uric acids are without action, but tannin and formic acid produce, when heated, a separation of cuprous oxide.—*Phar. Cen. Halle*, No 42.

Honey Artificially Colored.—A curious sophistication has been exposed

by Ch. Ménière. It appears that the more or less deeply colored honey from Bretagne is preferred in France for certain purposes; being rather scarce this year, it is manufactured in Paris by incorporating with honey a sufficient quantity of roasted bread, particularly the crust, which gives a yellow powder. By dissolving the honey in water the added powder may be collected upon a filter, and by this means the author has collected this novel adulterant in quantities ranging from 10 to 20 per cent. of the weight of the honey.—*Rép. de Phar.*, p. 610.

At the International Exhibition, just closed, there was some artificial honey, which appeared to be merely syrupy glucose flavored with a little honey.

Preparation of Artificial Wax.—A French patent, obtained by Pauvert, Moussay and Chauvin, gives the following directions:

1. Two parts of colophony (rosin) and one part of paraffin, or a similar hydro-carbon are fused together at 108° C.

2. Three parts of colophony are fused with one part of soap or stearic acid, and then washed with potassa solution. A little copal or vegetable wax may be added.—*Chem. Centralbl.*, No. 33, from *Bull. Soc. Chem.*

Preservation of Volatile Oils.—Well corked bottles, particularly if the cork is securely wrapped with thin gelatin, is recommended by E. Tornbory, of Jassy. As an instance of the security of the oils under corks, it is stated that, on digging a well at Salzwedel, there were found behind a wall, which probably belonged to the cellar when the building was destroyed by fire 200 years ago, two bottles containing oil of rosemary and of cloves, both being in a good state of preservation, although the corks were rotten and the oil of cloves of a brown color.—*Apotheker Zeit.*, No. 38.

Drying of Plants for the Herbarium.—As it is well known, the succulent plants (orchideæ, pinguicula, etc.) give the greatest trouble in drying, inasmuch as they easily lose their colors and become black, through incipient decomposition. It has been recommended to draw the plants slowly through a warm solution of 0·5 grm. salicylic acid in 300 grms. alcohol, shake well and dry in the usual manner in warm blotting paper, which has to be changed at least once a day.

Plants treated in this way dry quickly and preserve their colors

wonderfully. Orchis morio, Orchis militaris, Syringa alba, Asperula odorata, Pinguicula vulgaris, Gymnadenia conopsea, Rhinanthus, Cephalanthera, Œnothera biennis, Verbascum thapsus, Petasites albus, Juglans regia, Pedicularis palustris, all of which generally turn black in drying, keep their colors, especially the red and violet ones.—H. M. W., *Ny Pharm. Tid.*, 1876, p. 328.

New Method for the Volumetric Estimation of Silver.—Acid solutions of silver produce, with sulphocyanides, a white, curdy precipitate, resembling chloride of silver in appearance. In the presence of a ferric salt a blood-red coloration will be produced on the addition of every drop of the sulphocyanide solution, and quickly disappear as long as any silver remains in solution. The permanent appearance of the red color indicates the complete precipitation of the silver. This method, which has been proposed by Prof. J. Volhard, of Munich, is capable of very extended application, particularly for the estimation of chlorine, bromine, iodine and similar bodies, which are precipitated by silver from acid solutions.—*Phar. Cent. Halle*, No. 39, from *Jour. f. prakt. Chem.*

Recovery of Silver from Solutions of Silver Cyanide and on the Reduction of Silver Chloride.—Ernst Von Bibra has examined the various methods proposed, and recommends to precipitate the solutions with sulphuric acid, ignite the precipitate, digest with nitric acid and precipitate by hydrochloric acid. The precipitated silver chloride is treated by Gräger's process by adding ammonia and digesting with zinc. The greyish or whitish precipitate gradually becomes deep grey, almost black, and then contains zinc, which is extracted by dilute sulphuric acid, or better, by boiling with dilute hydrochloric acid, when pure silver is left behind.—*Jour. f. rpakt. Chem.*, 1876, pp. 185–192.

Notes on Sumbul.—The *Euryangium sumbul* is found in large quantities in the neighborhood of Chabarowka, a military post on the river Amur, in the province of Küsten, East Siberia, 9,000 versts from St. Petersburg. It is a perennial umbellifer, and grows to the height of from 3 to 5 feet. Its root is branched, fleshy, about 11 inches in circumference at the base, and $3\frac{3}{4}$ inches in diameter, with numerous rootlets, and covered with a brown bark. The root has a strong smell of musk, which, by moistening with water, is considerably increased. The stalk of the plant is always fleshy, equal in circumference at the base

with the root, becoming gradually more slender towards the top. The leaves are more than twice pinnatifid, the pinnæ lancet-shaped, sharply serrate, the umbels with 30 to 50 rays, the flowers white and small.

Besides the *Euryangium sumbul*, the author has met with another umbellifer, which resembles it very much in its entire habit, but may be distinguished by its smaller size, lighter leaves, and the absence of the musk-like smell of the root.

The Eastern Russian inhabitants call the *Euryangium sumbul* "Bärenklaue" (bear's claw), and use the root as a medicine. The Chinese living in the district use the root of the plant against various diseases, and call it "Lsóuma-tschen-tuk." It is also used by the natives internally as a remedy for swellings; with them it bears the names "Ofuokgi" and "Ouchi."

The author promises a future communication, giving the results of an examination of the separate constituents of the root as it is found in the district of Chabarowka.—Karl Wittmann, *Phar. Journ. and Trans.*, Oct. 21, from *Ph. Zeitsch. f. Russland*, vol. xv, p. 545.

A NEW BASIS FOR CANTHARIDES PLASTER.[1]

BY A. W. GERRARD.

Teacher of Pharmacy to University College Hospital.

In a report upon the official plasters presented by me before the meeting of our Conference held in London in 1874, the cantharides plaster was omitted from the list, as my experiments upon it were not then concluded. Mr. T. Groves, who was the president of the Conference for that year, remarked, in his discussion of my report, that the blister plaster was the only one in which he believed, therefore I thought it too important a matter to overlook, and am now in a position to lay the subject before you.

The basis of our present cantharides plaster, as is known, consists of a mixture of wax, prepared suet, resin and lard. In my experience with this basis, the most important faults it possesses are insufficiency of adhesiveness and flexibility, and by reason of this, after it has been spread a few days, and more especially during the winter months, it becomes brittle, cracks and peels from the surface of the material upon which it is spread. To overcome these objections it was necessary to alter the proportions of its present ingredients, or seek a new

[1]Read before the British Pharmaceutical Conference.

formula. I chose the latter, for I considered the presence of a granular body like mutton fat a quite unnecessary and useless ingredient, and to be the main cause of the objections urged. After numerous trials with mixtures of various proportions of wax, resin, fats and oils, most of which answered my object but indifferently, I tried Canada balsam, and found that when mixed with wax and lard in the following proportions it gave a very good result:

Take of

Cantharides in fine powder	6 ounces.
Canada Balsam	8 "
Yellow Wax	5 "
Lard	1½ "

Dissolve the wax, lard and balsam over a water-bath, add the cantharides, and allow them to macerate at a gentle heat for one hour, then stir till cold; during the winter months the lard may be doubled with advantage.

In deciding upon the above proportions, I have borne in mind that the plaster should be only just sufficiently adherent that on its removal from the patient the blister is not torn.

Plaster prepared according to this form has been on its trial for some time, it produces a good blister in from four to eight hours, and I have had no complaints concerning it. For experiment I placed a small plaster of this formula, and one of the B.P., upon my own arm, the former was seven hours and the latter nearly eight hours producing the desired result.

Canada balsam is, I consider, well adapted for the purpose I have chosen it, as from its terebinthinate character it has a solvent action upon the wax, which imparts to the mixture the desired qualities of adhesion and flexibility; it is also probable that it aids the extraction of the cantharidin from the flies.

A German pharmarcist, whose name I am unable to call to mind, has stated that an advantage is gained by treating the cantharides by the following process before making them into plaster: Digest the powdered flies with caustic soda, cantharidate of soda is formed, neutralize this with hydrochloric acid, cantharidin is liberated and chloride of sodium produced; the mass is then dried and mixed with the basis, the chloride of sodium being in no way detrimental. I tried the experiment, but obtained no apparent advantage.

A blistering plaster may sometimes fail from the bad quality of the flies, and in this matter if there is any suspicion, I think the judgment would be much aided by the use of a microscope. There are other causes of failure, such as the plaster being insecurely applied, or the patient's skin may be of that nature that vesicants will not affect it; these matters are outside our control. I have only attempted that which is within it, and believe the form I have given for cantharides plaster will be found an improvement on that to which we have been accustomed.

NOTE ON SALICYLATE AND SULPHOSALICYLATE OF SODIUM.[1]

BY JOHN WILLIAMS, F.C.S.

Salicylate of sodium has been much employed lately as an internal remedy.

It is made by neutralizing a solution of salicylic acid with caustic soda, and evaporating to dryness. It can be purified by crystallization from alcohol; the crystals formed are, however, very small and indistinct, and this method of purification is not generally adopted.

Complaints have appeared in the medical journals that the salt sometimes produces irritative effects when administered medicinally, and it has been suggested that probably a trace of carbolic acid may occasionally be retained by the salicylic acid made by artificial means, and thus the salt prepared from such acid is impure.

An examination of the salicylic acid made from carbolic acid by Kolbe's process soon proves that the product is not always to be depended upon as a pure homogeneous article; indeed it can hardly be otherwise, when we consider that the carbolic acid from which it is made is itself not an absolutely pure or definite article. Still, I must observe that the salicylic acid now being supplied is much purer and more definite than that which was at first sent into the market by the German makers.

Thus salicylate of sodium—made from the artificial acid—and from the great difficulty of purifying it by recrystallization—is liable to be more or less impure, and indefinite in composition. It thus appears desirable, if possible, to obtain a salt which can be purified, and obtained of definite constitution.

Sulphosalicylic acid appeared to offer such a compound. It was

[1] Read before the British Pharmaceutical Conference.

discovered many years back by Cahours, and has been further investigated by Mendius. The process described for its production is, however, one of considerable practical difficulty.

The vapor of anhydrous sulphuric acid is passed over salicylic acid kept cool; gradually a sticky, gummy mass is produced, which contains the new acid, and can be separated by appropriate means.

I have made several attempts to produce this conjugated acid by means of ordinary sulphuric acid, and have at length succeeded in doing so, but not without several failures. I find the following process to answer:

The salicylic acid must be very pure; the unpurified commercial acid, when treated with sulphuric acid, simply yields a black mass, giving off sulphurous acid, and yielding no sulpho-salt capable of giving definite crystals.

If pure acid is employed, then about twice its weight of sulphuric acid is quite sufficient. The mixture must be gently heated in a sand-bath up to about 100° C., when action will commence in the liquid, and considerable heat be developed. The beaker must be removed from the sand-bath, and the contents stirred, so as to regulate and keep down the temperature; but the cooling must not be sufficient to altogether check the reaction. If the temperature exceeds the proper point, little or no sulphosalicylic acid is produced, but apparently bisulpho-carbolic acid, which does not yield definite crystallizable salt.

When the reaction has been properly maintained, at the end of ten minutes or a quarter of an hour the temperature begins to fall and in a short time the whole becomes a solid mass, generally of a light brown color; this will speedily deliquesce if left exposed to the air; but it can be dissolved in water at once, and treated with carbonate of barium in the usual way. I may mention that as the sulphosalicylate of barium is not a very soluble salt, it is necessary to employ a considerable quantity of water, and filter the liquid while still hot. This solution of the barium salt, decomposed by an equivalent quantity of sulphate of sodium, which yields a solution of the sulphosalicylate of sodium upon evaporation to a small bulk, yields crystals; these crystals must be pressed from the mother-liquor and purified by recrystallization two or three times from hot water.

When pure, sulphosalicylate of sodium forms hard white prisms; it is not deliquescent, although very soluble in water. It is almost insol-

uble in alcohol, has no caustic, but a slightly bitter taste, and is altogether a salt well adapted, I think, for medicinal use.

Salicylic acid and its salts give, as is well known, a striking reaction with perchloride of iron, producing a dark purple coloration. The sulphosalicylates produce exactly the same reaction, proving that the salicylic acid radical is still intact in these compounds, and it is fair to infer that the medical properties of these sulpho-salts will be found in practice to be identical with, or perhaps superior to, the simple salicylates.

We have in the analogous case of the carbolate and sulphocarbolate of soda an instance in which the sulpho-salt possesses great advantages over the simple salt, and such may prove to be the case with the sulphosalicylates.

The acid itself is crystallizable, but deliquescent; the zinc salt is also very deliquescent. I have not paid any attention to the other salts as yet.

NOTE ON THE CONDITION IN WHICH SALICYLIC ACID IS EXCRETED BY PATIENTS.[1]

BY F. BADEN BENGER, F.C.S.

The question whether or not salicylic acid ever exists in a free, and therefore active condition, in the urine of patients being of some importance, the following experiments were made, and the results are offered as a small contribution towards a settlement of the point.

The urine of a patient who had taken 60 grains of salicylic acid during the day was collected in the evening and the following morning. It was slightly acid to test paper, and gave the purple reaction with ferric chloride characteristic of salicylic acid and its salts. A portion shaken with bitter almond meal in the proportion of two grains to the fluidounce immediately developed the odor of bitter almond oil. In a similar portion treated with two grains of mustard flour to the fluidounce, the odor of mustard oil was at once perceptible; mixed with forty grains of sugar and half a grain of German yeast to the fluid ounce, fermentation rapidly took place. Five fluidounces were evaporated to half an ounce, thoroughly shaken with its bulk of ether, the ethereal solution evaporated to dryness, and the residue dissolved in one fluidounce of sweetened water; to this half a grain of yeast was added,

[1]Read before the British Pharmaceutical Conference.

and fermentation immediately commenced. A portion set aside in a warm place decomposed with the same rapidity as another specimen of urine containing no salicylic acid or its salts.

Parallel experiments were then made with urine in which salicylic acid had been dissolved in the proportions of ¼ grain, ½ grain, 1 grain and 2 grains, to the fluidounce. Sweetened with sugar, and half a grain of yeast to the fluidounce added, the ¼ grain and ½ grain solution fermented more or less rapidly, the 1 grain solution slightly in twenty-four hours, whilst that containing two grains to the ounce remained unaffected. Mixed with bitter almond meal, two grains to the fluidounce, the ½ grain solution prevented the production of bitter almond oil, but with mustard flour in the same proportion a slight odor of mustard oil was apparent, nor did the 1 grain solution entirely prevent its production. Similar experiments were then made with aqueous solutions of salicylic acid, and ¼ of grain of acid to the fluidounce was found to be sufficient to prevent the action of ½ grain of yeast on 1 fluidounce of sweetened solution. Smaller quantities only slightly retarded the action. A larger proportion of salicylic acid was required to prevent the action of yeast on sugar than has been recorded by some experimenters, and, as might be expected, more acid was required to produce the same effect in sweetened urine than in sweetened water, some of it probably combining with the alkaline phosphates present; nevertheless, these experiments, as far as they go, seem to indicate that, at all events in the case under observation, the acid was not excreted in an active condition.

In connection with this subject, some experiments were made with urine in which salicylate of sodium had been dissolved in the proportions of 1, 2, 3, 4 and 5 grains to the fluidounce, 40 grains of sugar and half a grain of yeast were added to an ounce of each. The one grain and two grain solutions fermented rapidly, the three and four grain solutions less rapidly, and the five grain solution remained unaffected by the ferment.

Solutions of salicylate of sodium in urine appeared to exert no retarding action on the production of oil of mustard, or oil of bitter almonds. Aqueous solutions of salicylate of sodium acted in a similar manner.

It has been stated that the salts of salicylic acid do not possess antiseptic properties, but it is evident that salicylate of sodium is capable of pre venting fermentation if present in the proportion named.

ON AN ALKALOID OBTAINED FROM JABORANDI, ITS PLATINIC COMPOUND, AND THEIR FORMULÆ.

BY CHARLES T. KINGZETT.

In 1875 an alkaloid was isolated from the leaves and stalks of jaborandi (*Pilocarpus pennatifolius*, of Lemaire), almost simultaneously and quite independently by Mr. A. W. Gerrard and M. Hardy ("Amer. Jour. Phar., 1875, pp. 214 and 315). There is another kind of jaborandi, a species of Piper, from which Parodi has isolated an alkaloid of the formula $C_{20}H_{12}N_2O_6$.

To the alkaloid upon which M. Gerrard worked, the name of pilocarpina has been given. He has detailed the methods of extraction, and states that it forms crystallizable salts with hydrochloric, nitric and sulphuric acids. He further exhibited some crystals of the so-called hydrochloride in a dark-brown mother-liquor, at the last meeting of the Pharmaceutical Conference, but neither at that time nor since has he, or M. Hardy, or any other observer, published any formulæ for the alkaloid or its compounds. Mr. Gerrard has further stated his opinion that there are at least two alkaloids in jaborandi, and that the one upon which he worked gave no precipitate with phosphomolybdic acid. Several other papers relating to this subject will be found in the "Year Book of Pharmacy" for 1875.

More recently Hardy states that he has obtained from the distillate of an aqueous extract of the leaves of jaborandi a quantity of crude oil, containing a terpene which gave a crystalline di-hydrochloride. But the boiling point of 178° C., which he attributes to the hydrocarbon, would rather point to cymene than to a terpene. He also obtained a solid, colorless substance, which was not further examined ("L'Union Pharmaceutique," vol. xvi, p. 365). My first experiment was conducted upon the leaves of the plant. These were thoroughly extracted with water of 70° C., and the extract concentrated to a small bulk, filtered from deposited matters, rendered acid by hydrochloric acid, and fully precipitated with phosphomolybdic acid. The bright yellow precipitate, after thorough washing, was decomposed after the method of Sonnenschein, that is by heating with excess of baryta, and the excess of barium was removed by carbonic acid. The filtrate was strongly alkaline, and was found to contain barium. This barium was carefully removed by sulphuric acid, and the filtrate, which gave the characteristic reactions of an alkaloid with various reagents, was converted into

hydrochloride, but all attempts to obtain crystals by concentration on a water-bath, or in a vacuum over sulphuric acid, or by spontaneous evaporation, proved vain.

In the next experiment I took the stems and twigs of jaborandi, and extracted them after they had been cut up into small fragments, with boiling water, until the last extract contained no appreciable quantity of matter.

The extract was distilled to a small bulk, and it was observed that the first few litres of distillate came over milky, and that on standing yellow oily drops deposited. The small quantity and its volatile nature defeated an attempt made to isolate it. The concentrated water-extract obtained as above was treated with an equal volume of strong alcohol, which threw down dark-colored albuminous matter, &c. From the filtrate the whole of the alcohol was distilled off, and a great part of the water. The syrup of 300 cc. was now extracted with much ether. Next ammonia was added, as Mr. Gerrard stated in a letter to me that he had found the alkaloid in the water extract was combined with an acid, and the whole was again extracted with ether. Finally the syrup containing ammonia was extracted with chloroform.

The first ether extracts were strongly colored; the after ones only faintly; the chloroform ones not at all. From all these extracts the solvents were distilled, and after many and various unsuccessful attempts to get the residues combined separately in a crystalline form with hydrochloric acid, no sign of crystallization ever being obtained, all the products were united, ammonia added, and the whole again extracted by chloroform. The chloroform extracts on distillation left a colored aqueous syrup, which was rendered strongly acid with nitric acid, and gave a bulky yellow precipitate with phospho-molybdic acid. This precipitate was passed through the same treatment as that described above in the first experiment. The free base was found to contain barium, which was removed exactly by very dilute sulphuric acid, after which the whole was concentrated to a syrup of a pleasant nutty odor. The product was now acidified faintly with hydrochloric acid, and another attempt made to get a crystallization, both by evaporation on a water-bath and *in vacuo*, etc., but as before, quite in vain.

I therefore now removed the hydrochloric acid by dilution with water and agitation with oxide of silver, and evaporated the filtrate to

dryness, after digestion with charcoal, which removed much of the color. The residue was dissolved in absolute alcohol, filtered from a trace of reduced silver, and again evaporated to dryness, and the drying completed in an air-pump over sulphuric acid during a fortnight. The product was now analyzed, all cumbustions being effected in platinum boats, as the matter was soft and plastic, like gum.

(*a.*) 0·0204 grm. gave by combustion *in vacuo* with CuO and metallic copper, 21·8 cc. CO_2, and 1·8 cc. N normal, showing the relation of the N : C to be 1 : 6.

(*b.*) 0·1872 grm. gave by combustion with $PbCrO_4$ and metallic copper, 0·3762 grm. CO_2, and 0·1404grm. H_2O = 54·80 per cent. carbon, and 8·33 per cent. hydrogen.

Synopsis of Analysis.

		÷ at. wgts.	÷ N = 1.
	C = 54·80	4·566	5·80
	H = 8·33	8·33	10·50
Frankland's process	N = 11·03	·787	1·0
	O = 25·84	1·615	2·0
	100·00		

After the above analysis was completed, the rest of the alkaloid was dissolved in 87 per cent. alcohol, and treated with alcoholic platinic chloride, when a bulky precipitate was produced, but slightly soluble in cold, readily soluble in hot water. The yellow solution on concentration gave a crop of reddish-yellow octohedral crystals, which were isolated, rinsed with water, dried at 80° C., and analyzed.

(*a.*) 0·0404 grm. gave by cumbustion *in vacuo* with CuO and Cu, 26·2 cc. CO_2, and 2·3 cc. N normal, giving as the relation of N : C 1 : 5·7; and the percentage of N = 7·12.

(*b.*) 0·3532 grm. gave with $PbCrO_4$ and metallic Cu 0·412 grm. CO_2, and 0·142 grm. H_2O = 31·81 per cent. C.; and 4·46 per cent. H.

(*c.*) 0·2120 grm. gave 0·0496 grm. platinum, and 0.2128 grm. AgCl = 23·39 per cent. Pt, and 24·83 per cent. Cl.

Synopsis of Analysis.

	÷ at. wgts.	÷ Pt = 1.	
C = 31·81	2·65	22·4	
H = 4·46	4·46	37·7	
N = 7·12	·508	4·3	or $C_{23}H_{35}N_4O_4.2HCl.PtCl_4$.
Pt = 23·39	·118	1·0	
Cl = 24·83	·669	5·6	
O = 8·39	·524	4·4	

Now the analysis of the free alkaloid led to $C_{5\cdot8}H_{10\cdot5}NO_2$. Multiplying this by 4, and deducting $4H_2O$, we obtain the above formula derived from the analysis of the platinum salt:

$C_{22}H_{34}N_4O_4\cdot(4H_2O)$ = as dried *in vacuo*.
$C_{22}H_{35}N_4O_4$ = as combined with $PtCl_4$.

In conclusion, I have to express my indebtedness to Dr. Thudichum for having kindly placed his laboratory at my disposal during the prosecution of the foregoing research.—*Jour. Chem. Soc.*, Oct., 1876.

CHEMICAL EXAMINATION OF FÜH-LING (*Lycoperdon Solidum*) FROM CHINA.

BY J. L. KELLER, OF CHARLOTTESVILLE, VIRGINIA.

Among a number of interesting specimens which Mr. Justus Eck, of London, was kind enough to present, some two or three years ago, to the laboratory collections of this University, was one of this curious material, accompanied by the following extract in reference to it from the late Mr. D. Hanbury's "Notes on Chinese Materia Medica:"

"Füh-ling; *Pachyma cocos*, Fries (*Fungi*); *Lycoperdon solidum*, Gronovius; Pé-fo-linn, Cleyer (*Med. Sin.*, No. 189), Tafarinov (*Cat. Med. Sin.*, pp. 2–23); Puntsaon; Indian Bread; or Tuckahoe. A very large remarkable substance resembling ponderous rounded tubers having a rough blackish brown bark-like exterior, and consisting internally of a compact mass of considerable hardness, varying in color from cinnamon brown to pure white. These tuberiform bodies, which in weight vary from a few ounces up to several pounds, are found attached to the roots of fir trees, or sometimes buried in the ground of localities where firs no longer grow. They occur in South Carolino,[1] in some of the northern and western provinces of China, and in Japan. Their true nature is sufficiently perplexing. The older writers considered them to be a sort of China root (*Smilax*), a supposition which their outward appearance certainly favors, but which is immediately negatived when we find them to contain no trace of starch. Loureiro and Endlicher are content to describe them as tubers found upon the roots of fir

[1] They are by no means peculiar to this State. I have seen specimens found at various points from Virginia to Alabama on the Atlantic side of the country, and, as will be seen by the quotation from *Report of the Department of Agriculture*, they extend as far west as Kansas.

trees. Other botanists have placed them among fungi; Gronovius and Walter in the genus *Lycoperdon*; Schweinitz in *Sclerœticum*; Okur and Fries in *Pachyma*. The latest observations on the subject are some which were submitted to the Linnean Society by Mr. F. Currey and myself last year (1861) and published in the *Linnean Transactions*. The opinion there expressed is that these tuber-like bodies are an altered state of the root of the tree, probably occasioned by the presence of a fungus, the mycelium of which traverses, disintegrates or even obliterates the wood and bark. This mycelium appears under the microscope in the form of fine threads usually more or less mixed with bodies of irregular shape, somewhat resembling starch granules, but which are apparently cells of the woody tissue in a more or less advanced state of disease and distortion. Nothing is known of the more developed form of the fungus represented by the mycelium. The American Füh-ling has been examined chemically by Professor Ellett, of South Carolina College, who has stated it to consist entirely of pure pectin of Braconnot, but I think its composition deserves some further investigation. I find that the pure white internal substance (which is quite insipid and inodorous) is very slightly soluble in cold rectified spirit and in cold water, and not more so when boiled in water, the solution in each case yielding a flocculent precipitate with acetate of lead. When boiled in a weak solution of carbonate of soda the substance dissolves rather more freely, and the solution affords a scanty gelatinous precipitate (pectic acid) when treated with an acid, or (pectate of lime) with a solution of lime. In China the Füh-ling is made into edible cakes, which are frequently sold in the streets; it is also reported medicinal in a variety of disorders. In America it has also been used as an article of food, whence the name Indian bread."

The *Report of the U. S. Department of Agriculture* for 1870 (p. 423), in an article upon materials used as food by the North American Indians, has the following notice of this substance:

"*Tuckahoe or Indian Bread* (*Lycoperdon solidum*).—Two specimens of this fungus are in the collection of the Department of Agriculture—one from Nottoway Co., Virginia (fig. 1, plate 10), the other from Leroy, Kansas (fig. 2, plate eo). These singular fungous growths are subterranean and parasitic on the roots of large trees. A piece of root is often inclosed in the mass. The form is irregularly globose, about the size of a man's head. It is very rugous

and filled with cracks; the color externally is ashy black, in the interior white or nearly so, of a starchy appearance, very firm, and breaks into irregular masses. The Kansas specimen is rounded in shape, with a black, rough exterior, and a white and compact interior. When broken it has the appearance of a mass of dried dough, full of fissures and very granular. Booth and Morfit's *Cyclopædia of Chemistry* gives the following under the article of 'Picquotaine,' a highly nutritious plant used as food by Indians. It results from a disease of the *Psoralea esculenta*. Its composition is as follows: Nitrogenous matter, 4·09; mineral substances, 1·61; starch, 81·80; water, 12·50." The following remarks relative to the Tuckahoe are furnished by Dr. John Torrey: "It was first brought to the notice of the public by Dr. Clayton, who sent it to Gronovius under the name of *Lycoperdon solidum*, and as such described it in the *Flora Virginica* about one hundred and twenty years ago. Next it was described by the late Dr. von Schweinitz, in his 'Synopsis of the Fungi of North Carolina,' under the name of *Scleroticum cocos*. About the same time Dr. Macbride, of Charleston, South Carolina, sent to the Linnean Society of London his observations on that fungus. Without being aware of having been anticipated by Schweinitz, I described it in the 'New York Repository' about the year 1819, under the name of *Scleroticum giganteum*. I gave also a chemical analysis of it, showing that it is chiefly composed of a singular substance which I named sclerotin. Braconnot some years after this described the same principle, which he called pectin. In the *Synopsis Fungorum* of Fries, the fungus is called *Pachyma cocos*. In the *Proceedings of the Linnean Society of London* is an account by Rev. M. J. Berkeley of a large subterranean fungus that is sold as food in the streets of Shanghai, undoubtedly the same as the Tuckahoe."

And in the *Report* of the same Department for 1871 (p. 98) occurs the following from R. T. Brown, Chemist to the Department:

"*Tuckahoe or Indian Bread.*—This curious fungus (*Scleroticum giganteum*) is quite common in many parts of the Southern States, where it is frequently used as an article of food.[1] To determine its nutritive

[1] This is certainly an over-strong way of stating the facts. Specimens of the material in question are not very rare, and they are occasionally eaten by the negroes of the Southern States, but the substance can by no means be said to be common, or commonly used as an article of food. In the analysis there is obviously a little error of statement in reporting elementary nitrogen and accounting for all that remains of 100 per cent. in non-nitrogenous material.

value a specimen from Columbia, Virginia, was subjected to careful analysis in this laboratory, with the following results:

"Moisture	14·16
"Glucose (fruit sugar)	0·93
"Gum	2·60
"Pectose	17·34
"Nitrogen in an insol. combination	0·36
"Woody fibre	64·45
"Ash	0·16
	100·00

"This analysis does not sustain the high reputation of this substance as a food material."

The substance received from Mr. Eck being from China, while all the above statements as to chemical composition refer to material from America, and these statements differing so widely from each other, it seemed well to make a new analysis, which was done by Mr. Keller.

The specimen of Chinese Füh-ling examined was kidney-shaped, about 6 inches in longest diameter, and 3½ inches in shortest, and weighed about two pounds and a quarter. The rough, brownish-black bark-like exterior was about an eighth of an inch thick, verging gradually into the perfectly white uniform mass inside. The whole was compact and firm, but easily cut with a saw, and the fragments, after removal of the exterior crust, showed but little toughness and were easily crushed in a pestle and mortar. A sufficient quantity was reduced to fine powder, passed through a sieve, and thoroughly mixed. This powder yielded little soluble matter to either cold or hot water, but was much more freely dissolved by a dilute solution of hydrate or carbonate of sodium, the liquid produced in each case giving a flocculent gelatinous precipitate (corresponding in character to pectic acid) when treated with an acid or alcohol, such precipitate proving excessively difficult to wash. Starch and cane-sugar were carefully tested for, but none could be found.

The quantitative analysis was made as follows: Water was determined by prolonged exposure to 110°C.; albuminoid matter was calculated from the amount of nitrogen, determined by combustion with soda lime. For the organic matters soluble in water the powder was exhausted with water by repeated boiling, keeping the flask full of steam so as to exclude air; the liquid rapidly filtered, and evaporated (in a retort exhausted by a Bunsen's pump) to a small bulk. The

solution was then divided into two parts, continuing the evaporation of the one to dryness at 100°C., weighing the residue as soon as it ceased to lose moisture, incinerating, and weighing the ash left; while the other was separately evaporated to dryness, exhausted with dilute alcohol (which took up a little glucose), and the residue dried at 100°C. and weighed; this being burned and the weight of ash plus the previously determined weight of albuminoid matter deducted, the quantity of gum was found by difference. In the dilute alcoholic solution glucose was determined by Fehling's copper solution. The pectous material was dissolved out from what water had left by repeated boiling with a dilute (1¼ per cent.) solution of sodium hydrate, and precipitated by dilute sulphuric acid and alcohol, but it was found to be almost impossible to wash the slimy precipitate, and it could not have been relied upon as unaltered in weight from the original insoluble pectous material, so that this was estimated by difference. The cellulose left undissolved by the sodium hydrate was treated with very dilute sulphuric acid (in the cold and for a short time only), then thoroughly washed with water, thrown on a weighed filter, dried at 100°C and weighed; after burning the weight of the ash was deducted. The results were:

Glucose	0·87	Org. matter— Sol. in water	4·63
Gum (with a trace of acid)	2·98		
Albuminoid matter	0·78		
Pectose	77·27	Org. matter— Insol. in water	81·03
Cellulose	3·76		
Mineral matter, sol. in water	0·08	Ash	3·64
" insol. in water	3·56		
Water	10·70	Water	10·70
	100·00		100·00

These figures, especially if taken in connection with Mr. R. T. Brown's results, are strongly suggestive of the correctness of the opinion of Messrs. Hanbury and Currey as to the general nature of the substance, viz.: that it represents woody fibre altered by the interpenetration of a fungus mycelium. In the specimen analyzed by the Chemist of the Agricultural Department the alteration seems to have been incomplete, leaving a good deal of unchanged cellulose; in the case now under notice the cellulose has nearly disappeared. The very small amount of nitrogen renders the notion of the whole mass being simply an independent and developed fungus very unlikely.

Mr. Keller also made an analysis of the ash, to obtain which about 100 grms. of the substance was incinerated at a very low temperature in porcelain crucibles placed each within another of sheet iron serving as a hot air bath. The ash was tolerably free from remaining charcoal. Chlorine, carbon dioxide and silica were determined from the whole amount used; and after dividing the solution into two portions, sulphuric oxide and the alkalies were obtained from the one, and phosphoric oxide, ferric oxide, lime and magnesia from the other. The analysis afforded:

Crude Ash.	
K_2O	2·062
Na_2O	0·967
CaO	2·280
MgO	5·017
Fe_2O_3	5·208
P_2O_5	8·725
SO_3	0·700
Cl	0·724
SiO_2	18·424
CO_2	2·813
Charcoal	2·209
Sand	50·546
	99·675
Deduct O equiv. to Cl	0·163
	99·512

Pure Ash. (Deducting Sand, Charcoal and Carbon Dioxide.)	
K_2O	4·675
Na_2O	2·192
CaO	5·169
MgO	11·375
Fe_2O_3	11·808
P_2O_5	19·781
SO_3	1·587
Cl	1·642
SiO_2	41·771
	100·000
Deduct O equiv. to Cl	0·370
	99·630

The large amount of sand is not caused by want of care in removing the exterior portions of the mass. With a lens sparkling little siliceous grains can be detected on a perfectly clean cut surface of the interior. This again accords with the idea of a fungoid growth pushing its way in a sandy soil into disintegrating woody tissue, and cannot at all be conceived of as a result of simple independent vegetable growth. Part of the large percentage of silica found to be soluble, and perhaps of the iron also, may very likely be also mechanically derived from the soil, but how much we have no means of determining.—*Chem. News*, Oct. 20, 1876.

ANALYSIS OF FIFTEEN SAMPLES OF TEA. ALSO, AN INVESTIGATION OF METHODS OF DETERMINING THE TANNIN OF TEA.

BY J. T. CLARK, PH.C.

In estimation of *the portion soluble in water*, one gram of the tea was boiled briskly[1] for fifteen minutes with 50 cc. of water and the clear

[1] Wanklyn: "Tea, Coffee and Cocoa Analysis," p. 15.

solution carefully decanted; the residue boiled again with the same quantity of water and the clear solution decanted; the residue then dried on the water-bath and weighed, the loss being taken as the quantity sought.

The *determination of the tannin* in the decoction was tried by four of the numerous methods in use, without obtaining very nearly concurrent results from triplicate operations with each method. The method recommended by A. H. Allen,[1]—precipitation by standard solution of lead acetate, in presence of potassium ferricyanide as an indicator, was used for No. 1,—19 per cent. being the mean of three estimations, with a variation of nearly 5 per cent. The diffculty consisted in perceiving the pink color made with the indicator, masked as it is by the color of the tea decoction. The result given for No. 2 is the average of three varying determinations by Wagner's method with a standard solution of cinchonia.[2]

The variation was due to the difficulty in recognizing the red color of the indicator in the solution, distinct from the colored precipitate, in presence of the tea color.. No. 3 is given in the table as the average of three trials of the method of Hager,[3] by the diminution of density from removal of the tannin by copper oxide. The results were widely divergent—showing that this method which was proposed for oak-bark is not applicable to tea. No. 6 was worked volumetrically by solution of gelatin (Müller's method); three determinations giving considerable differences.

A volumetric method for tannin was then tried, with *use of standard solution of cinchonia sulphate in excess, titrating back in the filtrate with standard solution of potassium mercuric iodide.* Triplicate operations were tried on No. 4 and No. 5—the results for each number differing but slightly. The remaining numbers were worked by the same method: Nos. 10 and 12 being confirmed by closely agreeing duplicate results. The solution of cinchonia sulphate is Wagner's standard (before quoted): 4·523 grams cinchonia sulphate, with 0·5 gram sulphuric acid, in water to make one litre. The potassium mercuric iodide solution is Mayer's standard: 13·546 grams mercuric chloride

[1] "Chem. News," xxix., 169, 189.
[2] "Zeitsch. f. anal. Chem.," v., 4, 8; vii., 139.
[3] "Untersuchungen," II., 115.

and 49·800 grams potassium iodide in water to make one litre. To the clear and dilute decoction of one gram of the tea, obtained as above described, the cinchonia solution is added from the burette to slight excess and the quantity noted, the mixture filtered and the residue washed. Unless some means for "rapid filtration" be used, this part of the operation is very slow, but with any "filter pump" it is altogether satisfactory. To the filtrate with the washings the iodide solution is added, stirring until the precipitate is complete. The precipitate subsides quickly, and a drop of the clear solution on a blue or black glass slide treated with a drop of the reagent (from the burette) will show if farther precipitate can be obtained (the drops so taken being then rinsed into the mixture tested). Each cc. of the iodide solution precipitates 0·0102 gram of cinchonia, or 0·0124 gram of cinchonia sulphate, or 2·74 cc. of Wagner's standard solution of cinchonia sulphate. Each cc. of the last named solution precipitates 0·01 gram of tannic acid. Having the decoction of one gram of tea: cc. cinchonia sol.—(2.74 × cc. iodide sol.)=per cent. of tannin (in its equivalent of tannic acid).

The reports of *the proportion of tannin* in tea show remarkable differences. A. H. Allen, by volumetric determination with lead acetate as previously described, finds about 20 per cent. tannin in green tea and an average of 10 per cent. in black tea. G. W. Wigner ("Phar. Jour. Trans." [3], vi., 281), by same method, found in Assam 33 per cent. and 45·5 per cent.; in Young Hyson 39 per cent. and another 39 per cent.; in mixed Caper 42·3 per cent. The Young Hyson giving 45·5 per cent. was a mixture of six samples. Dragendorff ("Werthbestimmung," 1874, p. 60) quotes green tea at 12·32 and 12·70 per cent. of tannic and boheic acids, and a sample of black tea 9·42 per cent. Mr. Allen and Mr. Wanklyn take the average of tannin in black tea at 10 per cent. for a basis of calculation of presence and proportion of spent tea.

The *total ash* was obtained by the incineration of one gram of tea in a weighed crucible. For the *soluble ash*, the total ash was washed on a filter with hot water till the washings gave no residue, the residual ash dried and weighed, and the difference of weight taken.

The samples were obtained from the retail trade in Michigan.

No.	Name.	Price per pound.	Portion soluble in water.	Tannin.	Total Ash.	Ash soluble in water.
1	Japan, . . .	$0·65	36·5	19·	5·6	2·4
2	Young Hyson, .	0 80	39·8	12·4	5·0	2·4
3	Japan, . . .	0·90	41·8	9·5	6·3	3·9
4	Black, . .	0·90	44·5	10·6	5·5	
5	Young Hyson, . .	0·75	37·2	16·	6·7	
6	" " .	1·00	45·0	20·1	7·1	3·5
7	" " . .	0·85	44·9	17·5	5·7	
8	Japan, . .	0·90	35·7	14 6	6·1	
9	Oolong, . .	0·40	29·4	8·0	6·7	1·7
10	English Breakfast, .	1·00	21·2	5·6	5·2	1·3
11	Japan Siftings, . .	0·50	39·7	10·1	7·6	
12	Japan, . .	0·40	23·4	7·6	4·8	0·9
13	Young Hyson, . .	0·40	36·9	12·3	6·7	
14	"Am. Tea Co." .		41·5	16·7	5·6	
15	Oolong, . .		39·6	8·9	6·4	

The results in Nos. 10 and 12 indicate *spent tea*. By Allen's formula, the per cent. tannin indicates 55 per cent. of spent tea in No. 10, and 30 per cent. in No. 12. By Wanklyn's formula, the amount of soluble extract indicates 36 per cent. of spent tea in No. 10, and 28 per cent. in No. 12. The infusion of No. 10 had a very disagreeable odor. The low per centages of soluble ash in Nos. 10 and 12 also correspond with those of spent tea.

The fifteen samples were subjected to microscopic examination for *foreign leaves*. In No. 9, a considerable number of foreign leaves were found. These foreign leaves had an epidermis composed of small tabular cells; stomates mostly on the under side; the interior composed of an incomplete parenchyma of round cells and numerous intercellular passages.—*Amer. Chemist*, August, 1876.

NOTE ON THE GUNS OF SENEGAL.[1]

BY DR. A. CORRE.

In commerce the gums of Senegal are distinguished according to the district which yields them or the port from which they are exported.[2] They are (1) *Gommes bas-du-fleuve* (Bas-du-fleuve, Degana and Podor;

[1] "Journal de Pharmacie" [4], vol. xxiv, p. 318.

[2] These gums are not very often met with in general commerce, the greater part of them being imported into and used in France.—Ed. "Ph. J."

gums from the desert of Bounoun and the country of the Braknas); and (2) *Galam gums*, or *Gommes haut-du-fleuve* (Galam, Podor, Bakel and Medina). These gums, when carefully sorted, yield very different products, which the author classifies as follows :

A first group includes the gums in round pieces (*en boules*, so-called because of their form). The subdivisions of this group are regulated by the degree of consistence and resistance, size and color of the balls.

A. Hard gums (*Gommes dures*), of firm consistence, with large, clear, shining fracture :—(1) *grosse blanche :* pieces large or medium sized, entire, white or yellowish-white ; (2) *petite blanche :* pieces small, entire or in fragments, generally whiter than the preceding ; (3) *grosse blonde :* pieces large or medium sized, entire, yellowish or reddish yellow ; (4) *petite blonde :* pieces small, entire or in fragments, yellowish or reddish-yellow ; (5) *deuxième blonde :* pieces more or less large, entire, or in fragments, reddish ; (6) *fabrique :* pieces more or less large, entire or in fragments, reddish or brownish, moderately limpid, grumous or tear-like on the surface, with a fracture often resinoid, uneven and dull.

B. Soft or friable gums (*Gommes molles ou friables*): (7) *blanche*, (8) *blonde*, (9) *fabrique*.

In a second group the author places the gums occurring in elongated masses, a form which results doubtless through delay in the solidification of the gum upon the tree, caused by rains or humidity of the atmosphere : (10) *larmeuse :* in mammillated or undulated masses, clear light yellow color, shining at the surface, fracture clean, hard ; (11) *vermicelle :* rather dull white, surface corrugated, fracture pretty clean and shining, friable ; this gum is remarkable for its convolute form, which resembles that of vermicelli.

To a third group belong the gums in fragments and powder, the *débris* and residue of the preceding : (12) *gros grabeaux ;* (13) *moyens grabeaux ;* (14) *menus grabeaux ;* (15) *grabeaux triés ;* (16) *grabeaux fabrique ;* (17) *poussière*.

To a fourth group is allotted (18) *marrons* or *bois*, a largish gum, frequently of resinoid aspect, yellowish or brownish, mixed with, or adherent to, fragments of bark.

The Senegal gums are collected from a great variety of plants. The acacias (*Acacia nilotica*, *Verek*, *Adansonii*, *albida*, *dealbata*, *Sing*, *Seyal*, etc.) yield the greater part and the finest qualities. They are also obtained from the *Khaya senegalensis*, certain *Spondias*, some *Sterculiaceæ*, and perhaps *Bassia*, etc.

As the result of the study of the mode in which the gum is produced from the verek, the author is of opinion that the starting point is certainly in the cambium. When a transverse incision is made in a young branch, there is observed at first a sort of exudation, badly defined, between the wood and the bark. As the exudation becomes more considerable it raises the bark, and makes its way to the exterior through any cracks or fissures. But as there are two layers in this zone—a ligneous and a cellular layer—the question arises, In which layer does the gum take its origin? For the following reasons the author believes it to be formed in the lingneous layer, at the expense of the crude sap circulating therein.

(1) Upon different specimens of verek he has observed that at the level of the base of the gummy exudations the exterior woody bundles become deviated in the form of a capsule, and present traces of an erosive or destructive action. In very young branches, by the aid of a microscope, these bundles may be distinguished, dissociated and jagged, in the midst of the gummy matter.

(2) The balls of gum are frequently marked with very regular cavities, similar to those produced in a viscous mass by blowing air into it through a slender tube. These cavities cannot be due to the penetration of a gas coming directly from without, for they face inwards, *i. e.*, towards the base of the exudations; they could only be produced by the air from the vessels of the sap wood, ruptured and dissociated at the same time as the woody fibres.

(3) The mineral elements of gum (lime, etc.) belong to the crude sap.

Gum, however, is not simply water charged with salts, neither is it a highly concentrated saline solution. It is a product that presents great analogy of chemical composition with lignose. The author, therefore, considers gum to be the result of a kind of liquefaction of the elements of the sap wood by the crude sap.

It is incontestable that the formation of gum is connected with an anomalous state, due to excess of nutrition. It is observed more particularly at the points of budding and at the bifurcation of the branches, and it acquires a remarkable development upon abnormal nodosities—in fact wherever the nutritive action exists in the greatest intensity. Beyond certain limits, this energy in the rising of the sap is accompanied by a slackening of the circulation, which leads to a stagnation

of the liquid through the engorgement of the channels; hence, perhaps, by absorption, leading to the softening and liquefaction of the fibrous and vascular element of the sap wood.

In this phenomenon the easterly winds have a share, their high temperature and dryness favoring the determination of the sap to the exterior. Their influence is not, as often stated, limited to the production of cracks in the bark. It will be seen that there is a great analogy between the mode of the formation of a verek gum and that of the gum of Rosaceae, as described by Trécul.

Recently an important part in the production of the Senegal gums has been attributed to a loranthaceous parasite, which is met with frequently in Eastern Africa, not only on gum trees, but also on guava trees, palms, etc. The author has never observed the least exudation of gum at the points of implantation of this parasite, which itself takes up sap, and leaves no excess for the plant on which it is developed. The nodosities, which have probably been attributed to the action of this parasite and thus led to the suggestion, the author considers to be the results of insect punctures.—*Pharm. Journ. and Trans.*, Oct. 21, 1876.

VARIETIES.

ETCHING ON GLASS.—By E. Siegwart.—Since hydrofluoric acid can be sold cheaply, it seems to be more and more used for the decoration of glass. This can be easily understood, as glass articles, when sufficiently etched, will have a much better appearance than engravings on glass. The best decorations are obtained by etching several portions of the glass surface with ammonium fluoride slightly acidified with acetic acid. If plates of glass are to have an ice-like lustre, the glass is, in the first place, covered with a layer of very small shot, over which very dilute hydrofluoric acid is then poured. Results similar to etched photographs are obtained by exposing any negative picture on a layer of gum or caoutchouc-layer rendered sensitive by potassium bichromate, and then dusting it with red lead. The red negative thus obtained is fixed as usual, and burnt in, and the more soluble lead glass thus obtained is treated with concentrated nitric acid, whereby a dull white picture is produced, appearing positive when looked through.—*Jour. Chem. Society* [Lond.], from *Dingl. polyt. J.*, ccxx, 479–480.

ON THE PREPARATION OF SOME COLORED FIRES (BENGAL LIGHTS) USED IN PYROTECHNY.—By Sergius Kern, St. Petersburg.—In preparing colored fires for fireworks by means of the usual formulæ given in many manuals of pyrotechny it is often very necessary to know the quickness of burning of colored fires, so as in

some cases, as decorations and lances, they must burn slowly, in other cases, as wheels, stars or rockets and Roman candles, they must burn quicker. Working for some months with many compositions of such kind, I prepared three tables of colored fires (red, green and violet), where every formula with a higher number burns quicker than a fire with a lower number. For instance, No. 5 burns quicker than No. 6 and slower than No. 4. These tables will, I think, be of much assistance in the preparation of fireworks.

Green-colored Fires.

No.	Potassium Chlorate. Per cent.	Barium Nitrate. Per cent.	Sulphur. Per cent.
1.	36	40	24
2.	29	48	23
3.	24	53	23
4.	21	57	22
5.	18	60	22
6.	16	62	22
7.	14	64	22
8.	13	66	21
9.	12	67	21
10.	11	68	21
11.	10	69	21
12.	9·5	69·5	21
13.	9	70	21
14.	8·5	70·5	21
15.	8	71	21

Red-colored Fires.

No.	Potassium Cholorate. Per cent.	Strontium Nitrate. Per cent.	Sulphur Per Cent.	Carbon Powder. Per Cent.
1.	40	39	18	3
2.	32	46	19	2
3.	27	51	20	2
4.	23	55	20	2
5.	20	58	20·5	1·5
6.	18	60	21	1
7.	16	61·6	21·2	1·2
8.	15	63	21	1
9.	13	64	22	1
10.	12	65	22	1
11.	11	66	22	1
12.	10	67	22	1
13.	10	67·25	22	0·75
14.	9·25	68	22	0 75
15.	9	68.35	22	0.65

Violet-colored Fires.

No.	Potassium Chlorate. Per cent.	Calcium Carbonate. Per cent.	Malachite, powdered. Per cent.	Sulphur. Per cent.
1.	52	29	4	15
2.	52	28	5	15
3.	52	26	7	15
4	52	24	9	15
5.	52	23	10	15
6.	52	21	13	15
7.	51	20	14	15
8.	51	18	16	15

Violet-colored Fires.

No.	Potassium Chlorate. Per cent.	Calcium Cerbonate. Per cent.	Malachite, powdered. Per cent.	Sulphur. Per cent.
9	51	16	18	15
10.	51	15	19	15
11.	51	13	21	15
12.	51	11	23	15
13.	51	10	24	15
14.	51	8	26	15
15.	51	6	28	15

—*Chem. News*, Sept. 29, 1876.

THE PHYSICAL PROPERTIES OF GALLIUM.—M. Lecoq de Boisbaudran, in a recent note to the French Academy of Science, states that he has prepared about 7½ grains of gallium. In liquid state, the metal is a beautiful silvery white; but in crystallizing it turns blue, and its brilliancy becomes greatly diminished. The point of fusion is fixed, for the metal melts very slowly at 86·27° Fah., and crystal-

lizes very slowly at 86·09°. The density of the specimen is 5·935. Gallium crystallized under water crepitates sometimes on heating.—*Scient. Amer.*, November 11, 1876.

Chemical Reactions of Gallium.—By M. Lecoq de Boisbaudran.—Solutions of *pure* gallium, mixed with acid acetate of ammonia, are not rendered turbid by sulphuretted hydrogen, but if zinc is present the sulphide of this metal is charged with gallium, but the liquid is not entirely freed from it. If the salts of zinc are not plentiful enough to draw down at once all the gallium precipitable by sulphuretted hydrogen, it must be added in small portions until these products no longer give the ray Ga *a* 417·0 in the spectroscope. Only slight traces of gallium remain then in the liquid. On proceeding thus, the amount in the precipitates appears to remain at first almost constant, or at least to decrease slowly, and then more and more rapidly: it does not, therefore, seem to be a function of the amount of gallium in the liquid. Is there not here an indication of a combination between the two substances, or perhaps more probably a surface-attraction analogous to the fixation of a coloring matter upon a mordant. It is known that salts of zinc slightly acid are precipitated by sulphuretted hydrogen, the action being limited by the quantity of strong acid set at liberty. If the experiment is made with a chloride of zinc containing gallium, a notable quantity of this metal falls along with the sulphide of zinc. An ammoniacal solution of the salts of gallium and zinc is precipitated by hydrosulphate of ammonia. An excess of the reagent does not remove the gallium, unless, indeed, the sulphide of zinc is in such small quantity as to dissolve also. The case is different when the salt of gallium is pure. The ammoniacal solution is not rendered turbid by the sulphide of ammonium. If a neutral or slightly acid solution of the chlorides of zinc and gallium is submitted to fractionated precipitation with sulphide of ammonium containing free ammonia, the gallium is concentrated in the first products. If an ammoniacal solution of zinc and gallium is submitted to the same treatment, the gallium, on the contrary, accumulates in the last precipitates.—*Chem. News*, October 27, 1876.

Contributions to the Theory of Luminous Flames.—By Dr. Karl Heumann.—In this part of his treatise the author arrives at important results, both theoretical and practical. He shows that the carbon in the flame exists as a solid body, and not, as Frankland assumes, in the state of vapor. He finds that gas-jets of steatite are decidedly preferable to those of iron, since they consume less gas for an eqnal strength of light. Metallic jets, in general, notably enfeeble the light. He refers to the result obtained by the Commission of the English Board of Trade who reported, in opposition to the view of Vogel, that a refrigeration of the gas does not decrease the amount of light, and considers that they must have experimented with a kind of gas poor in hydrocarbons capable of condensation. On the contrary, he finds that if the jet and the outflowing current of gas are both strongly heated the luminous effect is increased to an extraordinary degree.—*Chem. News*, Nov. 10, 1876.

CHLORIDE OF LEAD DISINFECTANT.—The London *Lancet* directs attention to the value of chloride of lead as a deodorizer. The manner of its use is to dissolve half a drachm of the nitrate in a pint of boiling water, and pour this solution into a bucket of water in which two drachms of sodic chloride (common salt) have been dissolved. After chemical action has taken place, the clear supernatant liquid is an odorless saturated solution of chloride of lead. If this solution be thrown into a sink or vault from time to time, the disagreeable odors will soon be destroyed. A ship's bilge was completely disinfected in this way by simply dissolving half an ounce of nitrate of lead in boiling water, and pouring it into the bilge water, which itself supplied the necessary sodic chloride. Cloths wet with this solution, and hung in fever and accident wards of hospitals, are said to keep the atmosphere sweet and healthy.—*Scient. Amer.*, December 2, 1876.

TO DISTINGUISH BETWEEN COTTON AND WOOL IN FABRICS.—Ravel out the suspected cotton fibre from the wool and apply flame. The cotton will burn with a flash, the wool will curl up, carbonize and emit a burnt, disagreeable smell. Even to the naked eye the cotton is noticeably different from the filaments of wool, and under the magnifier this difference comes out strongly. The cotton is a flattened, more or less twisted band, having a very striking resemblance to hair, which, in reality, it is; since, in the condition of elongated cells, it lines the inner surface of the pod. The wool may be recognized at once by the zigzag transverse markings on its fibres. The surface of the wool is covered with these furrowed and twisted fine cross lines, of which there are 2,000 to 4,000 in an inch. On this structure depends its felting property. Finally, a simple and very striking chemical test may be applied. The mixed goods are unraveled, a little of the cotton fibre put into one dish and the woolen in another, and a drop of strong nitric acid added. The cotton will be little or not at all affected; the wool, on the contrary, will be changed to a bright yellow. The color is due to the development of a picrate.—*Scient. Amer.*, December 2, 1876.

DISTINCTIVE REACTION BETWEEN REDS FROM ARTIFICIAL ALIZARIN AND THOSE FROM EXTRACT ON MADDER.—By M. J. Wagner.—The author finds that extract reds are very much injured by a mixture of soda and potassic ferricyanide, whilst artificial alizarin-reds are scarcely affected. This difference is doubtless due to the presence of purpurin in the extract which is destroyed by this reaction.—*Chem. News*, Oct. 27, 1876, from *Bulletin de Mulhouse*.

ENGLISH DEALINGS WITH FOOD ADULTERATIONS.—If there is any one subject on which the British public is extremely sensitive, it is the quality and purity of its food and drink. No country, we believe, has such stringent legislative enactments against adulterations; and the legal formalities for their enforcement are made so few and simple that the aggrieved consumers now waste no time in vain denunciations, but summon the offending grocer or butterman forthwith before the nearest magistrate to answer for the fraud.

An excellent instance, showing how persistently warfare against spurious materials is waged, is found in attacks now being made in England on artificial butter. It is a well-known fact that, until recently, attempts to produce even a moderately palatable artificial butter have failed; and although the product has been made of fair savor while fresh, a day or two's keeping has turned it into mere tallow. In England, however, the fraud has not ended at this. Conscienceless individuals have sold as butter, it is said, horrible concoctions of old lubricating tallow, and even old tallow candles *minus* the wicks, which an official analyst describes as "supplied to the poor in the last stages of rottenness." One factory was detected making this delectable product at the rate of two tons a day. This and many other like cases being well known, it is but natural that the British public should cordially detest "grease butter." The London *Grocer* has lately printed long reports of trials of sellers of the adulterated material; and to show how rigidly the penalties against the adulterations are enforced, we note that a retailer who purchased grease butter, innocently supposing it to be genuine cream butter, and who sold it to a customer as the latter, was nevertheless fined $50, and further proceedings were ordered to be taken against the wholesale merchant from whom he obtained his supply.

We have frequently remarked this same severe dealing in England with every other species of food fraud. At the same time, no one need remain in ignorance as to what constitutes fraud, because the parliamentary reports on the subject, even in respect to tobacco and other unnecessary luxuries not classified as food, contain reliable and full information relating thereto. The whole matter is a suggestive one for us in this country. Here the prosecution of a retailer by a private citizen, because of the former selling ¾ lb. of grease for 1 lb. genuine butter, as in the above cited instance, would be considered extraordinary. Our main reliance for protection is in the vigilance of health boards, whose jurisdiction is local and limited in authority. Hence, in most cities, we may look in vain for either frequent prosecutions or reports of adulterations prepared under official auspices, although the possibility of such reports being compiled is plainly indicated by the admirable yearly work of the Massachusetts State Board of Health. Reports, however, can merely warn us of evils in the shape of food adulterations, under which we shall probably continue to suffer until penalties are enforced, as rigidly here as they are in England, against each and every retailer who wittingly or unwittingly sells a spurious article.—*Scient. Amer.*, December 2, 1876.

VARNISH FOR SILVERWARE.—Gum elemi, 30 parts; white amber, 45; charcoal, 30; spirits of turpentine, 375. It must be used in a heated state, the metal to which it is to be applied being also heated.—*Scient. Amer.*, Nov. 11, 1876.

MINUTES OF THE PHARMACEUTICAL MEETING.

THE second meeting of the Session was held November 21st, 1876, Dillwyn Parrish, President, in the chair. The minutes of the previous meeting were read and approved.

Dr. W. W. Lamb was introduced, and the chairman stated it gave him pleasure to see the room so well filled with members in attendance.

The following donations to the library were announced by Prof. Maisch, and upon motion of C. L. Eberle, the thanks of the College were returned to the donors. From Prof. Alfonso Herrera, Mexico: Nueva Farmacopea Méxicana de la Sociedad Farmacéutica de de México, 1874; Aguas potables de México, 1869; also some numbers of Gaceta Médica de México. From Mr. W. Thiese: Trommsdorff's Pharmaceutische Waarenkunde, 1806; Dulk's Pharmacopœa Borussica, 1829; Geiger's Handbuch der Pharmacie, 1833; The Botanico-Medical Recorder, 1840.

R. V. Mattison read a paper on Extract of Malt (see page 531), and exhibited a sample of the product and also an emulsion of cod-liver oil and extract of malt containing 50 per cent. of oil, its odor disguised with almond and wintergreen. It is readily prepared, no gum or other emulsifier being required. It readily mixes with water, but separates the oil as a creamy layer upon standing, and upon again shaking the mixture is restored.

A. P. Brown stated the same facts were true where an infusion of malt was used in this manner—the oil being emulsified by simply agitating it with the infusion.

Prof. Remington exhibited specimens of Russian Isinglass obtained from the Russian Commissioners. They comprise various kinds of sturgeon, carp and silure isinglass from astrachan, consisting of leaves in various thicknesses, circular pieces and long cords tied together; also, so-called "crumbs."

Prof. Maisch exhibited Dugong Oil, also pure Gelatin in sheets, made in Hanau, Germany, by Otto Lindenbauer, and a sample-card of colored Gelatin made by Carl Spatz. The raw material used is the residues from the bone-button works. The gelatin is of the finest quality—the samples exhibited, in addition to the white, were of many beautiful colors.

At our next meeting it is expected the Committee on Cabinet will be prepared to show many interesting specimens.

On motion, adjourned, to meet December 19th, 1876.

WILLIAM MCINTYRE, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY.—The second social and conversational meeting was held in the College Hall, November 2d, 1876, at 3½ P. M. Thirty-four members present.

Among the subjects of interest presented was oil of Ceylon cinnamon *leaves*, which Dr. Miller stated was much lower in price and very pleasant in odor, though differing from the oil of the bark in its resemblance to cloves. This resemblance, suggesting the presence of eugenic acid, Mr. N. A. Kuhn volunteered to ascertain by the appropriate tests.

Oil of Florida cedar was shown by Dr. Miller, who had had it offered him as an excellent adulterant for oil of sandal wood, which it resembled in odor.

Mr. Boring stated that tincture of columba could be made perfectly clear by percolating the root without previous moistening.

The use of paraffin in the process of enfleurage, as practised in the French flower farming districts, was alluded to, and in connection with it French oil of rose, as exhibited at the Centennial, the first made in that country, worth twenty-five dollars an ounce in gold.

Mr. McIntyre stated that Irish dulse was used largely for food in his neighborhood, being esteemed alterative in its effect. It consists of two species of algæ, which are common on the coasts of Ireland and Scotland, namely: *Halymenia* (s. Fucus, s. Rhodomela), *edulis and palmata*, Agardh.

President Kennedy gave the outlines for a process for making diluted hydrocyanic acid, in which the concentrated acid is made as usual, but stronger alcohol used as the diluent. This, he stated, seemed to keep perfectly unchanged.

A discussion ensued on the means of preservation of ointments, after which the meeting adjourned. WALLACE PROCTER, *Secretary*.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.—At the pharmaceutical meeting held November 1st, President John Williams in the chair, Prof. Archer made a few general remarks about the chemical and pharmaceutical sections of the Centennial Exhibition, and gave an account of the exercises at the commencement of the Philadelphia College of Pharmacy, at which he had been present.

Mr. Thos. Greenish read a paper containing suggestions for an improved method of making *mistura guaiaci* and similar mixtures. In endeavoring to dispense an emulsion of copaiba resin, the author had met with unexpected difficulties, which he overcame by triturating the resin with some milk-sugar, then adding alcohol, and afterwards gum arabic in place of the mucilage ordered, the mixture being finished by the requisite amount of water; the quantities were as follows: Res. Copaibæ ℥iss; Sacch. lactis ℥iii; Alcohol ℥iii; Pulv. Acaciæ ℥v; Aquæ ad ℥vi. m. This suggested a slight alteration in the officinal guaiacum mixture, which the author proposes to make in a similar manner, by using powdered guaiacum, sugar of milk and gum arabic, of each half an ounce; rectified spirit 5 fluid drachms and cinnamon water sufficient to make one pint (imperial).

A question by Mr. Gerrard, as to whether copaiba resin was not frequently contaminated with copper, led to several statements that the resin attacked copper and lead, and should, therefore, not be prepared in metallic stills; moreover, it should not have a green color. In the discussion the purity of different varieties of guaiacum resin, and the cause and nature of the change of its color to green were referred to; also the necessity of extended researches on emulsions, natural as well as artificial, and the changes occurring during and after mixture with certain liquids.

Mr. Martindale exhibited several varieties of spread plasters, prepared by an American firm, and alluded to their very adhesive basis and great flexibility. Great

superiority of india rubber was claimed by Mr. Gerrard over gutta percha for this purpose.

Mr. Holmes exhibited a specimen of a more translucent benzoin, which yielded, by sublimation, beautifully white benzoic acid, and was said to come from Zanzibar; it was considered, by Prof. Bentley, to resemble most nearly Pereira's translucent Siamese benzoin, which Dr. Royle conjectured to be derived from *Styrax Finlaysonianum*. The great peculiarity of the specimen exhibited was the translucency of the white tears, which are generally opaque.

A specimen of *olibanum*, with some of the papery bark adhering, was also exhibited. It was the variety called by the natives, *Lubân matti*, was derived from *Boswellia Frereana*, Birdw., and distinguished from other varieties by a peculiar whitish efflorescence on the surface and stratified opaque layers in its interior.

Professor Bentley called attention to the blue fluorescence shown by water in which galbanum had been macerated for an hour or two, and to which a drop of ammonia was then added. Asafœtida would cause a similar fluorescence, but not to the same extent; and with ammoniacum it was scarcely observable. The fluorescence is due to the presence of umbelliferon in the gum resins.

PHARMACEUTICAL SOCIETY OF PARIS.—At the meeting held October 4th, the death of Mr. Gobley was announced (see page 576).

Dr. Jaillard exhibited a sample of adulterated *sulphate of quinia* which had recently been sent to Algiers, the adulteration consisting of about 70 per cent. of potassium nitrate. It is not observable to the eye, but on heating a portion, deflagration takes place and a white ash is left.

Mr. Yvon reported on researches on *Xanthium spinosum* (see page 538), and stated experiments made with the view of determining its alleged prophylactic action in hydrophobia, had given decidedly negative results.

THE GENERAL BELGIAN PHARMACEUTICAL ASSOCIATION has remonstrated with the government against the granting of pharmaceutical degrees by universities at which no pharmacists are acting either as professors or examiners, and has, at the same time, petitioned for the establishment of a pharmaceutical school, which, like in other countries, should be under the control of pharmacists.

SWISS APOTHECARIES' ASSOCIATION.—The Thirty-second Annual Meeting was held at Neuchatel, August 24th and 25th, Prof. E. Schaer, President, in the chair. Besides the interesting address of the President, the usual routine business and the consideration of some local affairs, the following subjects claimed the attention of the meeting: Assaying of milk by various methods; a new apparatus for sealing wafer capsules, patented by Digne, of Marseille; Leube's *Creosozon*, the mineral water of Noivaigne, and a number of new and rare drugs, exhibited by Prof. Schaer. The so-called creosozon is a mixture of from 1 to 3 parts of sulphuric acid with 100 of water, and has been recommended for the preservation of animal

substances, such as meat, etc. Perrenoud explains its preservative action by the neutralization of the organic bases which are formed on the putrefaction of animal matter, and by the prevention of such a change.

THE APOTHECARIES' SOCIETY OF BERLIN, at its session, held October 24th, listened to a discourse by Mr. Holtz, on the Centennial Exposition at Philadelphia.

Dr. Schacht proposed as basis for *bougies* and *suppositories* a mass consisting of 10 parts glycerin, 25 water and 6 gelatin.

A curious substitution for *black pepper* was shown, introduced in consequence of its high price; it consisted of cubebs which had been completely deprived of their stalks.

EDITORIAL DEPARTMENT.

THE JOURNAL closes with the present number its forty-eighth volume. During the year which is about to close, as in former years, it has been a welcome visitor to many pharmacists at home and abroad, and we trust will hereafter not only continue to number them amongst its readers, but will likewise make many new friends. Our friend and colleague, the Business Editor, reminds us, however, that the publication of the JOURNAL requires monthly a considerable outlay, and that a number of our readers have—perhaps in the pressure of business—omitted to make the usual annual returns. We are sure that it needs only this gentle hint to recall the unpaid bills to their minds and to remit promptly the arrears not only, but likewise, if the money can be spared before the holidays—and we imagine the JOURNAL to be a very good holiday present—the subscription price for the ensuing volume. Most of our readers, we are glad to say, bear in mind our mutual obligations; the few who have overlooked one side of the question, will doubtless follow their example.

Our readers are aware that the pages of the JOURNAL are open for the discussion of all subjects having a pharmaceutical interest, and we bespeak for the next volume as many original communications as we had the pleasure to receive before.

It should be stated yet that for the essays published on pages 544 to 549 we are indebted to the *Pharmaceutical Journal and Transactions* (London), September 30th.

SWEET GUM.—On page 335 of the July number we gave some information obtained from Mr L. Hughes, Dyersburg, Tenn., of some of the uses to which this exudation of Liquidambar styraciflua is put. In another communication the same correspondent states that he has employed its solution in ether, in which it dissolved rapidly and entirely, for the purpose of *cutting* the mercury in preparing mercurial ointment. Mixed with a little fixed oil of almonds it acted admirably, the mercury being extinguished in a short time. Our correspondent remarks that, in his opinion, the "sweet gum" would answer all the purposes of the more expensive tolu balsam, and that it can be obtained for about $1 per pound.

OPIUM ANTIDOTES.—On page 464 of this journal for 1873, will be found the analysis of a "cure for the habitual use of opium," manufactured in Cincinnati, and containing a considerable amount of morphia. Similar preparations are made elsewhere, as will be seen from the annexed report made to the Cumberland Medical Society, Ind., which we copy from the "Boston Med. and Surg. Jour." for Oct. 26; we desire to direct the especial attention of our readers to it so that they may use their influence to expose this and similar frauds.

The committee to whom was assigned the duty of investigating the so-called "opium antidote" prepared by Mrs. J. A. Drollinger, of La Porte, Indiana, beg leave to report that a sample bottle of the article, which was obtained directly from the manufacturer, was sent to Dr. Edward R. Squibb, of Brooklyn, N. Y., for quantitative analysis. His onerous engagements rendered it impossible for him to conduct the investigation in person, but he sent the specimen to Messrs. Walz and Stillwell, chemists, New York, a firm which he thoroughly confides in and indorses. So deeply interested did he become in the project that he insisted upon bearing the expenses of the analysis, in spite of the committee's expressed unwillingness to have him assume such a tax.

Walz and Stillwell report that "this sample is glycerin colored with anilin red, and containing in solution crystallized sulphate of morphia 1·383 per cent. by weight"—about seven grains to the ounce.

While this investigation was progressing, the committee found another alleged "opium antidote," prepared by "Dr. S. B. Collins, the Great Narcologist of the Age," likewise of La Porte, Indiana. A specimen of this was submitted to Dr. Henry Carmichael, Professor of Chemistry in Bowdoin College and Assayer of the State of Maine, who arrived at the following conclusions:—

"(1.) The opium antedote contains morphia.

"(2.) The morphia is combined with sulphuric acid.

"(3.) The sulphate of morphia amounts to 3·2 per cent., or fourteen grains to the ounce."

Dr. Walz says that he made an analysis of Collins's "antidote" in 1871, and found that it contained morphia, though he did not ascertain the quantity.

In conclusion, your committee respectfully suggests that the society take some action which will result in the wide dissemination of the information which has been acquired concerning these dangerous preparations.

FREDERICK HENRY GERRISH,
GEORGE F. FRENCH,
THOMAS A. FOSTER, } *Committee.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A systematic Handbook of Volumetric Analysis, or the quantitative estimation of chemical substances by measure, applied to liquids, solids and gases. Adapted to the requirements of pure chemical research, pathological chemistry, pharmacy, metallurgy, manufacturing chemistry, photography, etc., and for the valuation of substances used in commerce, agriculture and the arts. By Francis Sutton, F.C.S., etc. Third edition. Philadelphia: Lindsay & Blakiston. 1876. 8vo, pp. 430. Cloth, price $5.50.

The author first gives a table of the commonly-occurring elements with their symbols and atomic weights, and gives then a concise explanation of the technical terms employed in volumetric analysis, such as *normal solution*, *titration*, etc. Part I is devoted to the general principles upon which this method of quantitative analysis is based, the description of the instruments and apparatus, the preparation of the solutions and the explanation of the direct and indirect processes of analysis.

Part II describes the analysis by saturation or neutralization, embracing the vari-

ous methods of estimating free and combined acids, alkalies and alkaline earths.

Part III treats of the methods of analysis based upon reduction or oxidation by hyposulphite of sodium, arsenious acid, iodine, permanganic and chromic acids.

Part IV is devoted to the analysis by precipitation with and without the use of an indicator.

The general descriptions of the different methods of volumetric assay is then followed in Part V by the application of these principles to the analysis of special substances, to the determination of which they have been ascertained to be applicable; and, in Part VI, by the special application to the complete quantitative analysis of wine, soils, manures, natural waters and sewage.

Part VII, which has been contributed by Prof. McLeod, treats of the volumetric analysis of gases, describing the necessary apparatus and methods to be followed. The Appendix contains a few additional processes for the estimation of nitrites and three or four metals, and several tables for corrections for temperatures in the analysis of gases.

The work being intended for those who are sufficiently advanced in chemistry, its pages are not filled with minute descriptions of elementary manipulations; but the descriptions of the processes and manipulations are characterized by keeping an acceptable middle between the former and inconvenient conciseness. They are clear, and enter, particularly in the special applications, sufficiently into detail to avoid misconception, and, wherever necessary, excellent cuts facilitate exactness of understanding. We regard the work as very well adapted to the purposes for which it was written, but must remark that the pharmaceutical requirements are limited to the estimation of inorganic elements, some organic acids, tannin and sugar, the estimation of alkaloids, for instance, not being embraced in the scope of the volume.

Illustrations, typography and paper leave nothing to desire; and if we add that the proof-sheets have been evidently read with great care, and that a good index has been prepared, it will be seen that the book can be consulted and used with profit and dispatch.

Medicinal Plants, being descriptions with original figures of the principal plants employed in medicine, and an account of their properties and uses. By Robert Bentley, F.L.S., and Henry Trimen, M.B., F.L.S. Philadelphia: Lindsay & Blakiston. Parts 6, 7, 8. Price, $2.00 each.

The parts of this excellent work now before us contain plates with the usual descriptions of Anamirta paniculata, Canella alba, Barosma betulina and serratifolia, Physostigma venenosum, Pterocarpus marsupium and santalinus, Hemidesmus indicus, Illicium anisatum, Polygala Senega, Camellia Thea, Melaleuca minor, Uncaria Gambir, Chimaphila corymbosa, Ophelia Chirata, Schœnocaulon officinale (Sabadilla), Althæa officinalis, Balsamodendron Opobalsamum, Exogonium purga, Nicotiana Tabacum, Ricinus communis, Pinus Larix and Canna edulis.

Dissertation sur les Caractères spécifiques du Genre Colchicum et sur quelques espèces nouvellement découvertes en Grèce. Par Theo. G. Orphanides, Professeur à l'université d'Athènes. Florence, 1875. 8vo, pp. 11.

Dissertation on the specific characters of the genus Colchicum and on several species recently discovered in Greece.

The author enumerates 43 species of colchicum, three of which, contained in the herbarium of the Museum of Florence, are as yet undetermined. Of the four species recently discovered by him in Greece, one, which he names *Colch. Boissieri*, has a horizontal rhizome, similar to Anemone nemorosa; the three other species are *C. eubœum*, *C. Parlatoris* and *C. polymorphum*, the latter being allied to C. neapolitanum, Tenore, and may perhaps be a variety of it. The author directs special attention to the very variable characters of the leaves and the different parts of the flowers in most of the species, considerable variations being frequently met with in the same plant. Five of the species enumerated belong to Africa, 21 are found in Europe and Asia, 7 are indigenous to Greece and other parts of Europe and 10 are characteristic of Greece.

Recherches expérimentales sur le rôle physiologique et thérapeutique de la Pancréatine. Par Th. Defresne, pharmacien, etc. Paris: A. Delahaye, 1875. 12mo, pp. 102.

Experimental researches on the physiological and therapeutical action of pancreatin.

After a brief review of the literature on the pancreatic juice, the author states that in its dried state it is usually called pancreatin; he has succeeded to preserve the juice, which is otherwise readily altered, for over three weeks, by mixing it with half its volume of ether. This preservative property of ether has been utilized for the preparation of pancreatin as follows: Fresh pancreas, after being bruised, are introduced into a suitable vessel together with ether, and kept at a temperature of 45°C. for 24 hours, when the glands will be completely disintegrated, the fibrous tissue floating upon the surface. The etherial juice is now rapidly evaporated in a current of air at a temperature of 40°C., and the residue powdered.

Thus obtained, pancreatin forms a pale-yellow powder, which is very soluble in water, forming a viscous solution of an animal flavor and coagulating by heat, like albumen. Alcohol precipitates from the solution the pancreatic ferment, while the liquid portion is inert. Pancreatin is destroyed by heat at about 70°C., also by strong acids and alkalies; tannin, as well as metallic salts, give insoluble precipitates with it; very dilute acids and alkalies do not disturb the solution, and the salts of the alkalies neither alter the pancreatin nor lessen its action.

The author then considers the action of pancreatin upon the nitrogenized aliments, starch, fats and mixed food, and finally its medicinal uses. It may be given in soup, a little bread or some sweetened water, in doses of 0·50 to 0·75 grams (7 to 12 grains); or in *pills* prepared from 4 grams pancreatin, 0·50 honey and sufficient of an inert powder to make 20 pills, three to five of which may be taken just before meals. The *pancreatic elixir* should not contain over 8 per cent. of alcohol, and if necessary the wine should be completely freed from tannin by egg albumen. It is made of 4 grams pancreatin, 120 white wine, 175 crystallized sugar and 10 tincture of coffee; dose, a tablespoonful, containing 0 25 gram. (4 grs.) pancreatin. *Pancreatic emulsion of codliver oil* (or other oil) is made by digesting at a moderate heat for 24 hours 1,000 grams codliver oil, 40 powdered pancreatin and 300 simple syrup. It is now perfectly miscible with water (cherry laurel or other aromatic water may be used for diluting it), and may be given in chocolate, milk, coffee or broth to suit the taste.

The pamphlet concludes with a number of reports from hospitals, in which these preparations of pancreatin have been tried.

The Physician's Visiting List, for 1877. Philadelphia: Lindsay & Blakiston.

This being the twenty-sixth year of its publication, is sufficient proof of its usefulness for the medical practitioner. As usual, it is published so as to be adapted for the records of from 25 to 100 patients a week.

Letters about the Exhibition. New York: Office of the *Tribune.* Large 8vo, pp. 72, double columns. Price, 25 cts.

This is a republication in pamphlet form of the letters written by the special correspondent of the New York *Tribune*, and originally published in that paper. They are written with good judgment and in an acceptable style.

OBITUARY.

TH. GOBLEY, a distinguished pharmacist of Paris, died recently at Luchon, and was buried in Paris. He entered as apprentice with Mr. Guérin, his brother-in-law, who had succeeded Robiquet, and after obtaining the title of *pharmacien* at the Paris school, commenced business, where he soon established a considerable reputation. In 1842 he became attached to the school of pharmacy as professor, and in 1868 he was made a member of the council of public hygiene, in both of which positions he labored assiduously. Many of his scientific investigations are of considerable importance, and have been noticed in full or in abstract also in this journal. The deceased repeatedly held offices of public trust, and was a member of the commission for the revision of the new Codex. Having been married to a daughter of Robiquet, he was happy in his family circle, where he enjoyed the fruits of a long and useful life.

HENRY ETIENNE ST. CLAIRE DEVILLE died suddenly on October 11th. The deceased was born on the island of St. Thomas in 1818, and was for many years professor of chemistry at the Collége de France at Paris, and a member of the French Academy of Sciences. He enjoyed a high reputation as a scientific investigator, and became widely known through his researches on the platinum metals, magnesium, aluminum, silicium, boron, the artificial production of crystallized minerals, etc. Many of his valuable contributions to science have been noticed in former volumes of this journal.

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